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THE AUTOMOBILE

General view of Olympia, showing uniform scheme of decorating the stands

Streamline Bodies at Olympia

German Lines Have Been Widely Copied by British Builders—All-Steel Constructions Gain Favor—Armchair Seats in Use—Many Window Improvements

LONDON, Nov. 17—One-third of the main floor of the Olympia motor show for this year was given over for the exhibits of thirty-seven coach building concerns who specialize on building bodies for individual users. These coach builders meet the car buyer face to face and their designs represent the demands of the car buyer, to a greater extent than do the bodies built by car-building companies and sold in standard form. This array of British and continental body builders has offered little in the radical so far as body lines are concerned. The jobs are invariably utilitarian, and generally in proportion as this utilitarian end has been achieved, has beauty of design followed as a matter of course.

While the external lines are not radical, the internal equipment shows progress over a year ago. Every attention has been given to incorporating baggage-carrying space by means of compartments in rear of the front seats and in some cases in rear of the tonneau seat. The unsightly spare wheel or tire on the side of the limousine is being in a few cases carried in compartments in rear of the seats, and all of the other unnecessaries on the running boards have been ensconced within the body and chassis lines.

The introduction of the one-piece body shell with its consequent reduction in weight together with added strength must be considered an important advancement in body lines. In this construction, the panels are autogenously welded together; and the roof is similarly united with the sides and ends, so that the entire body is a one piece shell with rivets. Beading is made integral with the paneling.

The equipment of closed types shows perhaps the greatest progress and these vehicles have added conveniences and luxuries not found on them previous to the present show excepting in isolated cases. Semi-automatic means for raising and lowering the window glasses; anti-rattling devices for the windows; sashless windows; arm chairs for limousines and landaulets; adjustable seats to accommodate the driver to the steering wheel; ventilators in the roof; windows in the roof to give a wider street vision; baggage compartments in rear of the front seat; and a score of other added conveniences show how active have the body designers been in the last 12 months.

The one-man top has firmly established itself for touring cars, and is now a recognized equipment. The side bow no longer offers interference when entering and leaving. The streamline

body originated by the German is seen everywhere, and there is a pronounced trend toward the curved or semi-cylindrical side which gives a roomy body and an attractive torpedo effect.

Comparatively few of the English automobile manufacturers make the bodies for their cars for the simple reason that the output of the average English factory is so small that it could not make the bodies as cheaply, or as well as the coach builder. It is stated that another reason for this is that the English motorist is never satisfied with a standard type of body, and it would not pay an automobile factory to build its bodies to the order of the individual. However, the fact remains that the majority of the foreign automobile makers are content to turn out chassis, while the sales agents cooperate between the motorist and the coach builder as regards the body design to be fitted thereto. Therefore, there are more than forty coach building firms in England today, all of whom are competing with each other in the design and production of automobile bodies.

As all up-to-date touring cars are now of the torpedo design, a touring car therefore is simply known as a torpedo, while a runabout or roadster is known as a two-seater. In addition there are limousines, landaulets, cabriolets, coupés, and saloon or Pullmans; and variations and combinations of these known as three-quarter or double landaulets, cabriolets, coupés, saloon-limousines, landaulets or cabriolets, and limousine-landaulets. A cabriolet is one with a top that when up, is very substantial and gives the car the appearance and comfort of a limousine, but which may be lowered so that the car is entirely open and has the appearance of a touring car. A double or three-quarter landaulet is a landaulet having a window behind the back door pillar, or with two windows on either side of the tonneau. The same applies to a double- or three-quarter coupé or cabriolet. A saloon or Pullman is an inside-driven four or six-passenger car with an inclosed fixed top, and with no partition between the front and rear seats. The combinations of these various types of bodies, as indicated by the names, are bodies so constructed as to be readily converted from one to the other.

As for the general trend in body design, in addition to these combinations all makers seem to be in favor of the scuttle-dash with the dash-fittings on a board under the forward edge thereof; nearly all bodies are of the straight or streamline effect with no sharp angles between the radiator and the rear of the body.

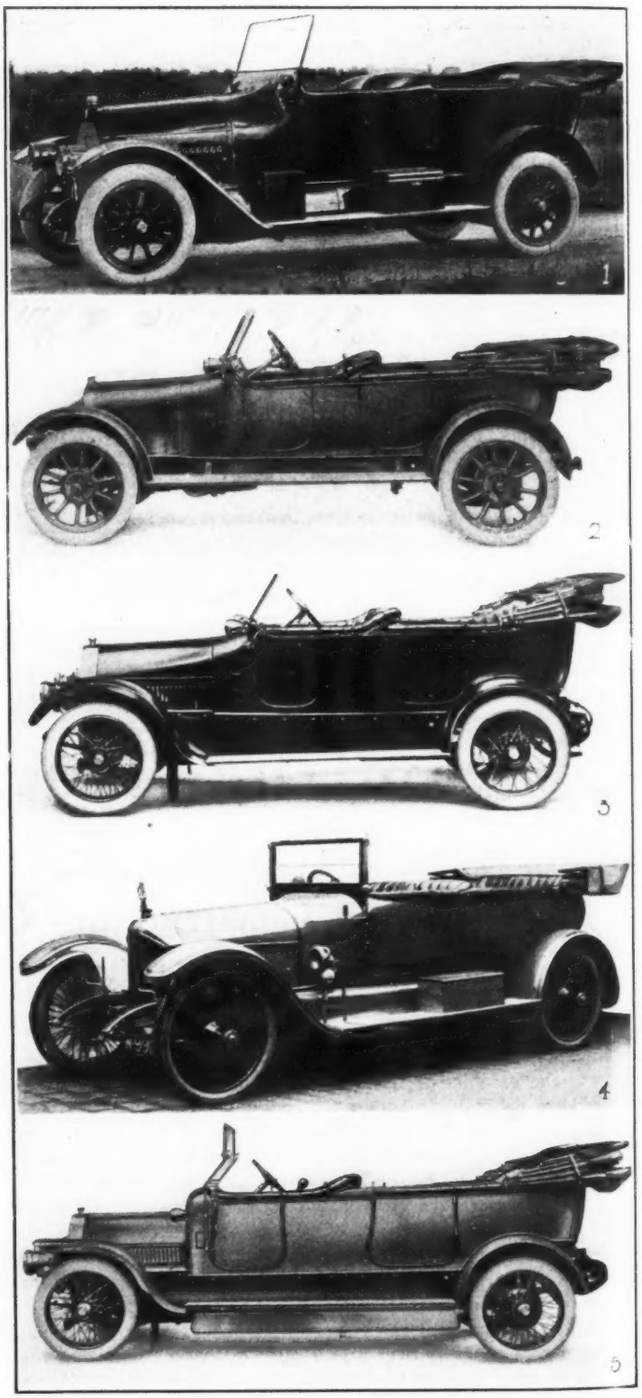
Domed roofs are as common as the domed fender, or mudguard construction, and both tend toward a more harmonious effect and substantial construction. Nearly all bodies have a round cornered back or large radius, and the rear fenders are partially formed by the body. There is a strong tendency toward the use of front fenders and webs which are made from one piece of metal, and several makers have a large tool box incorporated in the front fenders near the running boards.

Luxury of Maythorn Limousine

One of the most elaborate limousines was shown by Maythorn. It is upholstered with gray flowered silk brocade and the fittings trimmed with mother of pearl. The interior equipment has a cabinet in each of the front corners, the left one containing a large Thermos bottle, and the right one a set of china, comprising cups, saucers and plates all safely arranged in suitable racks, while in the door a set of knives, forks and spoons are neatly arranged. There are four pieces of each to serve four persons. An electric fan is suspended from the roof, in close proximity to a square skylight which may be easily opened to admit fresh air into the car. Two folding chairs are placed in the tonneau which rest on the floor, and have no attachment to the body, so that they may be placed in any desired position, and can be removed when not required. A V-shaped lug also is fitted onto the pillar of the door which jams into a suitable groove in the standing pillar to secure the door against vibration when closed.

Mulliner's Anti-Noise Windows

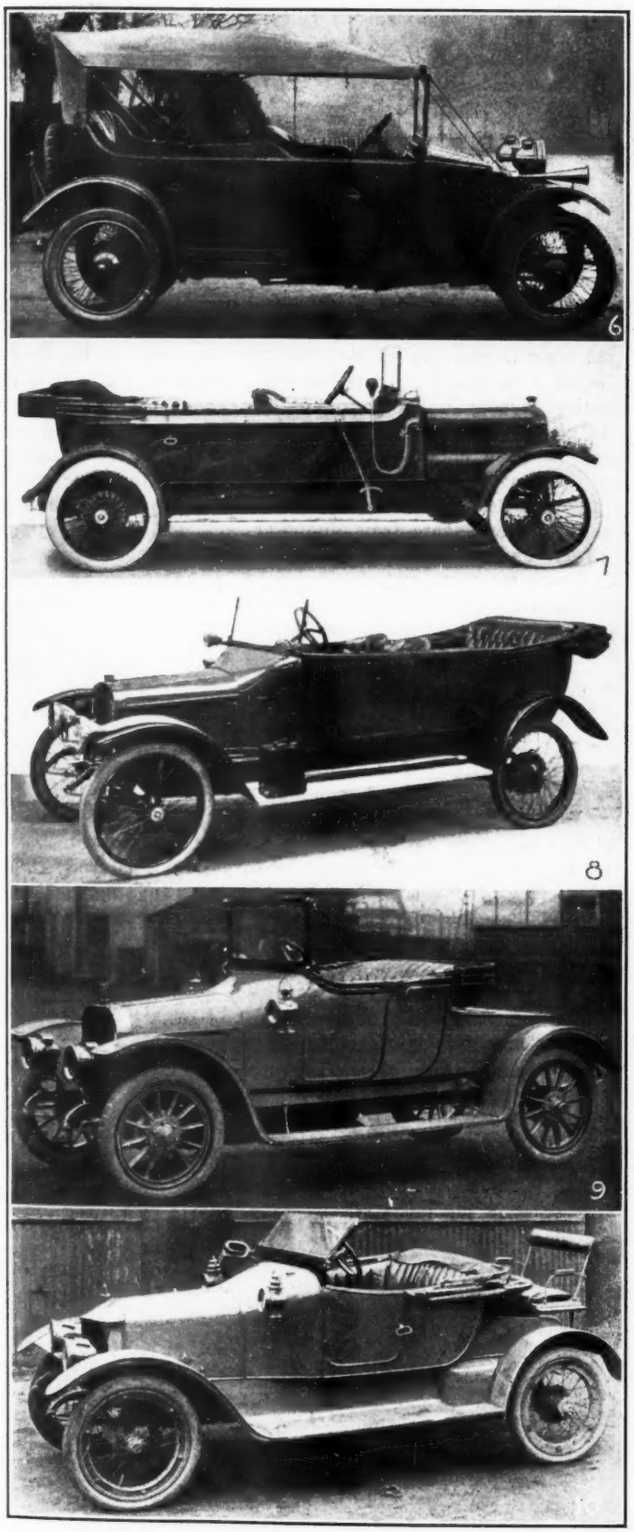
Mulliner & Co. makes a specialty of curl inlaid mahogany, an excellent sample of which is shown in the roof and inside trimmings of its limousines. Patent window appliances are used which comprise a horizontal rubber-clad rail which is mounted inside of the door so that it bears against the frameless window pane throughout its width. It is pivoted and a small lever secured to the center of it pierces the door panel. A spring normally holds the rail against the glass, and the rail is inclined upward against the pane so that the weight of the window tends to wedge it into secure contact with the rubber strip, but



Typical British Body Styles

1—Fifteen-twenty-five horsepower Benz with streamline body
2—Humber 10 horsepower with torpedo lines
3—Humber 20 horsepower flush-sided type
4—Crossley-Schelsley four-passenger torpedo
5—Humber 28 horsepower with wide doors

when the little protruding lever is pressed the rail is drawn away from the window pane and it is free to be raised or lowered. A rubber cushion 1-inch deep is provided for the windows to strike on when dropped. The lower body portion is free from moldings. It is made from three pieces of steel welded together by the acetylene process. The roof, also of steel, is made from four pieces similarly welded. The body rests on anti-vibrant pads of rubber 3-8 inch thick. Side glasses are fitted opposite the front seats to keep drafts off the backs of the front seat passengers. The floor is covered with a popular form of long-haired sheep skin rug. There is an overhead cupboard in the upper back portion of the interior, and lockers are also provided under the scuttle dash, on either side.



Typical British Body Styles

6—Lanchester 38 horsepower six-cylinder type
7—Daimler 20 with horizontal body lines
8—B. S. A. small car for four passengers
9—Argyle streamline two-seater
10—Turner two-seater with pointed radiator

Felt Pads Between Chassis and Body

H. Hamshaw exhibited a limousine with folding arm-chair extra seats that face forward or back. There is a folding arm in the center of back cushion, and there is a silk parcel net overhead which extends back about a foot from the front partition, and stretches from side to side across the car. Felt pads are used between the body and chassis; the window stops are comprised of velvet-lined channel pieces which are operated by small levers that press them against one edge of each window pane. Rubber anti-rattler pads are fitted near top of shut pillars of doors. A fiber inlay striking plate is used, which is claimed to wear better and smoother than metal, and is less noisy. This fiber inlay is secured by two brass screws and is readily removable. There also is a special dove-tail in the front standing pillar just below the striking plate, composed of a gun metal case fitted with rubber blocks shielded by small flat steel springs. This is to hold the door firm and prevent vertical vibration.

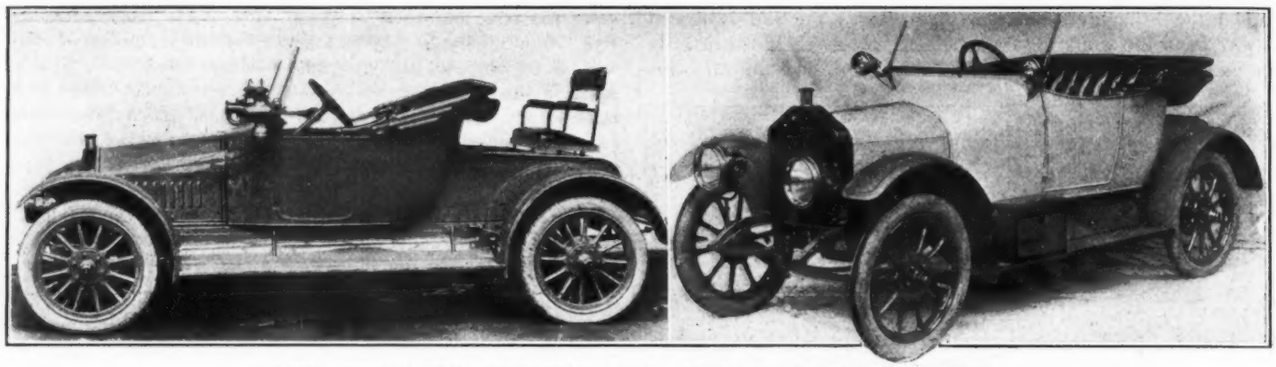
Van Den Plas Cushions on Floor

Some of the cleanest, neatest and most graceful body designs are productions of Van Den Plas. A Sheffield-Simplex touring car has very deep seat cushions, the back seat cushion 10 inches deep, and the front seat cushions 12 inches in depth. The front seat cushions rest directly upon the floor and there is a shoulder in the middle of the back cushion of front seats. The dash is a deep scuttle type, and there are ventilators in the side which are very large, and provided with external scoops or loubres which catch and deflect the air into the front seat compartments. Just under the edge of the scuttle there is a clock-board containing all of the usual dash fittings. Cocoa matting covers the front floor and foot boards, and serrated sheet aluminum covers the running boards. Dome-shaped mudguards are fitted, and there are two metal tool or luggage boxes combined with the front mudguards. A patent luggage carrier or trunk rack is fitted to the rear. Another limousine has a patent leather extension over the front seats which rolls back on a spring roller, like an ordinary window curtain. Van Den Plas bodies are steel constructions throughout, and the mudguards with the webs and aprons between them and the frame are made from a single piece of metal.

The patent Grosvenor seat designed by Van Den Plas is used on several of the cars. Its virtues are that it is sliding, tilting, revolving and removable. It is a sliding seat mounted on ball-bearing runners, with an automatic catch that permits it to be locked in any position. Tilting of the seat to any angle desired by the passenger is obtained by adjusting two positive screws. The seat is revolving if required, and can be readily removed for cleaning or other purposes. It is specially recommended for enclosed driven cars and it can be fixed in any car in a simple manner without requiring any adjustment from the coach builder. The seat comprises two ball-bearing rails to be sunk in the floor boards, one bottom plate carrying the automatic catch with handle to be manipulated by the driver. In a bush in the center of this plate is fitted the top plate which carries the tilting screws, and on this plate the upholstered seat is securely fastened by means of screws.

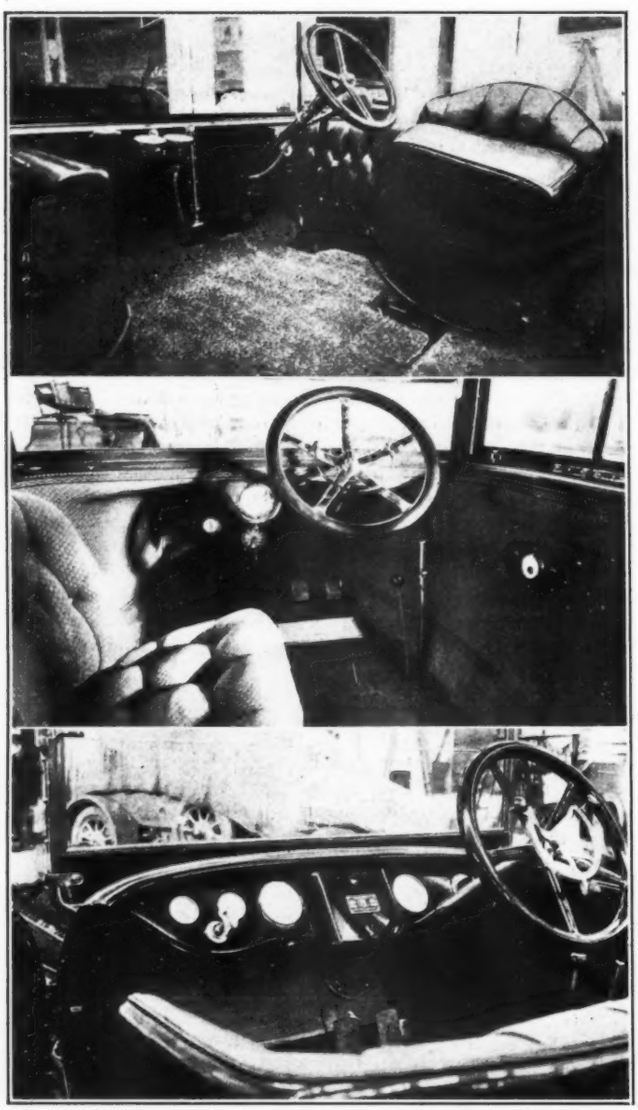
Convertible Landaulet-Saloon Bodies

Mulliner, London, exhibited a new saloon type of landaulet, consisting in an arrangement for immediate conversion of the body from the ordinary landaulet to a saloon which is done by



Swift runabout with folding dickey seats. Singer two-seater with rear deck

simply removing the windows from the partition behind the driver's seat and placing them in the doors opposite the front seat. Thus the back partition comprises two readily removable windows, each of which is comprised of two panes of glass mounted in a double-grooved frame and free to slide past each other. When these windows are in the partition behind the driver's seat the front seat compartment is open at the sides and when mounted in the doors of the front seat compartment, the car is converted into a saloon which is entirely enclosed. The seating capacity is for four with two emergency seats which are kept out of sight in cabinets in the front partition of the tonneau when not in use. The interior is also relieved with polished mahogany inlaid with ivory around the doors and windows. Besides the large cabinets in the front partition into which the two spare seats disappear and lock, there are two drawers and three neatly arranged and useful cupboards. The roof over the front seats is of polished mahogany inlaid. Two shelves are provided under the scuttle on either side and the glass front is V-shaped so that either side may be opened independently of the other.



Folding Seats in B. S. A. light car
Interior fittings in De Dion Bouton Salon type
Instrument board on Sheffield-Simplex touring car

Windows for Cabriolet Types

The Mulliner cabriolet has a quick-opening hood, and the compact folding arrangement provided when it is open. The windows are contained in a special narrow channel giving a high appearance and are fitted with a device which holds them in any position without rattling. Springs also are fitted underneath which facilitate raising and lowering the window, and which do away with the straps ordinarily employed for lifting them. In another limousine the windows may be raised or lowered by simply turning a large handle which has a hinge joint in its shank that permits it to fold down against the door panels. Curved glass panes are mounted in the partition behind the front seats, and these are free to slide in velvet-lined channels so as to admit air or afford communication between the front seat and tonneau passengers. There are side glass panes opposite the front seats, and the glass front is unique in that the adjustable upper half of it extends down about 2 inches below the top edge of the lower half which is fixed. On the bottom of the upper portion of the front glass, there is a brass rail having a rubber strip extending inward for contact with the lower glass, and a channel or trough on the outside or front edge to catch the water that drops down the panes and drain it off to the sides of the car.

Double Cabriolet Body Types

Connaught showed a double cabriolet, having two windows at the side of the tonneau. It is elaborately fitted and upholstered, and has an umbrella holder inside the front door pillar, which consists of a small water-tight receptacle at the bottom on the floor, and a small chain with a quick connecting clasp at the top to hold the umbrella upright. It has two independent extra folding chairs which, when not in use, fit into specially provided recesses in the front partition. Windows are framed with light rubber-lined metal channels.

Adjustable Pillows in Limousine

Cirencester showed a landaulet-limousine fitted with two silk pillows having a border of round silk cord with loops at the ends by means of which the pillows may be hung in a convenient position for the head. Hooks for receiving two of the loops at corners of the pillows are provided at the top back where

the roof joins the back panel. There is no speaking tube in this car, but there is a small opening in the glass of the partition just opposite the left side of the driver's head, with a little glass door that is mounted in a metal frame and hinged at the top. Spring hinges are fitted and a snap lock, so that when a catch is pressed the door flies open. The opening is about 2 inches wide and 6 or 7 inches long. This arrangement is known as a Hall's flap.

Tools and Baggage Carried in Tonneau

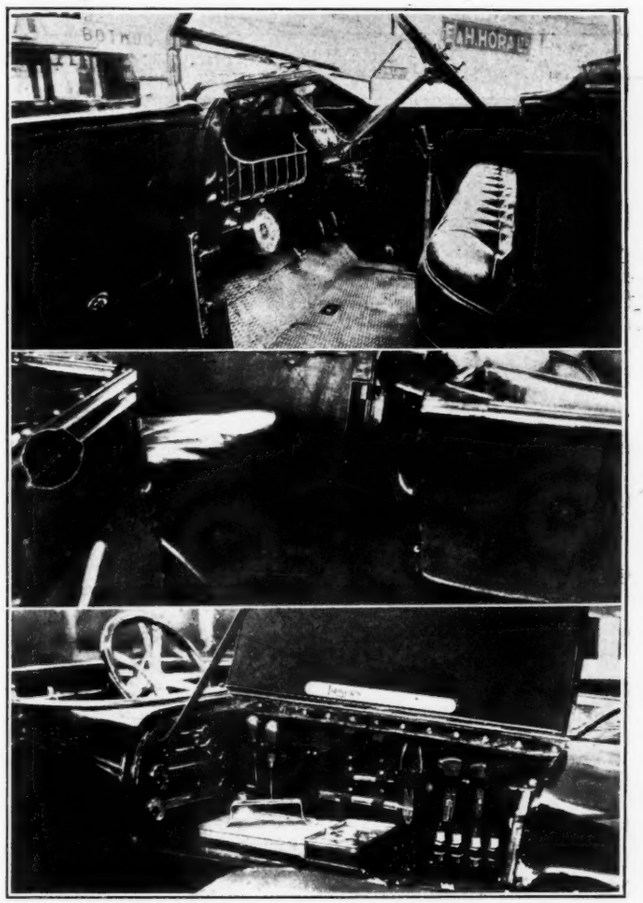
A four-passenger Shelsley-Crosseley sporting type touring car has tubular side panels which give it a real torpedo contour, and a deep scuttle dash with a board under the edge to bring the dash fittings into a convenient position. An inclined foot board is provided in the tonneau like that of the front seat compartment, and behind this there is a very large tool or luggage cabinet. The glass front is mounted in a narrow brass frame with the lower edge of the glass cut, and the frame bent to fit close to the curved shape of the scuttle on which it is mounted.

Rear Seat Cushions on Floor

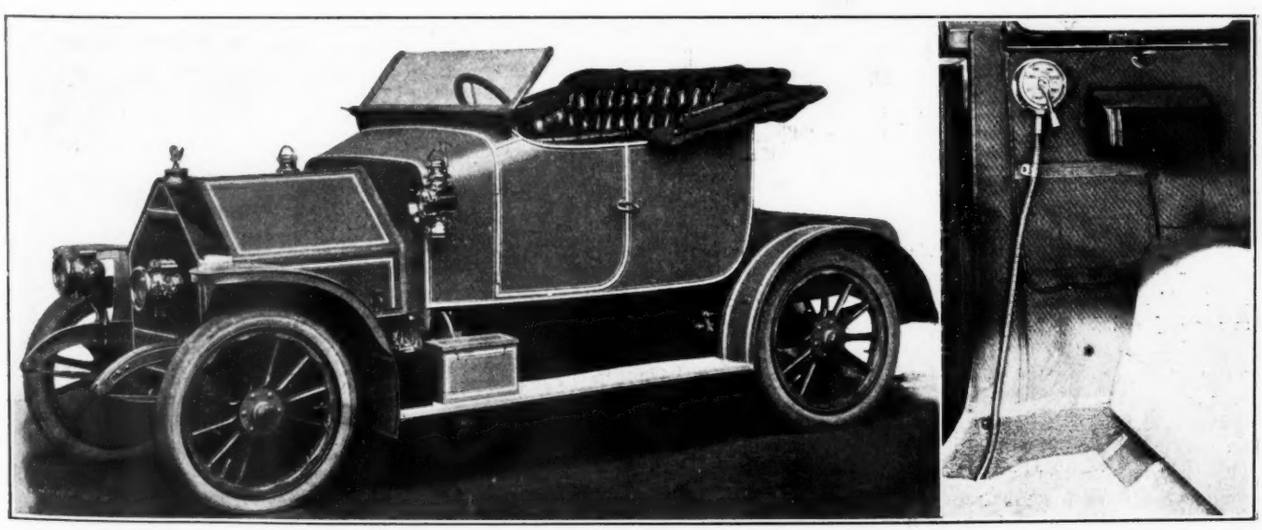
Cole showed a coupé cabriolet with a sliding bucket seat for the driver; a sliding and folding seat beside it, and a very comfortable cushion at the rear for two people. This rear cushion can be removed entirely as it rests directly on the floor, and the whole space can be used for luggage. A large box for tools and luggage is provided at the back outside the body and a grid can be mounted on this to furnish more luggage carrying space. This body, therefore, combines the advantages of a town carriage and a touring car.

Sliding Hatch in Limousine Roof

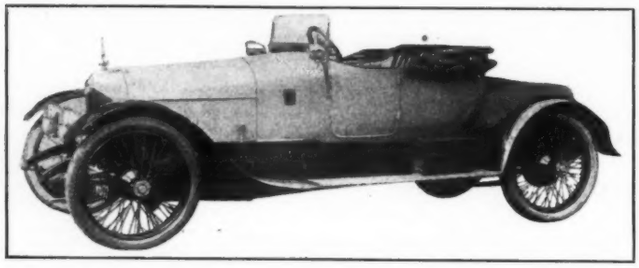
Thrupp, Maberly & Holland showed a limousine having practically all of the most up-to-date features of modern automobile body design and construction. This is a six- or seven-passenger body, having room for three on the back seat, two removable folding arm chairs which may be placed so that the occupants may face forward or backward. The body rests on an anti-vibrant pad composed of a canvas envelope filled with horsehair. These pads are 5-8 inch thick and 2 inches wide, and are interposed between the body and chassis. Another feature is the sliding hatch roof by means of which almost the entire roof over the tonneau may be readily slid forward to admit air or sunshine. Thus the side windows may remain closed against dust. One may stand up in the tonneau and look out through the hatchway. Precautions are made to prevent the door from coming open should it not happen to be tightly closed, this consists of a secondary recess or catch in the striking plate into which the lock bolt is sure to catch when the door opens about an inch or two. All windows have a patent operating fitting that facilitates opening and closing and prevents rattling; these fittings include a small handle which when turned in one direction draws the window sash or frame away from the glass and renders it free to be moved up or down, and when turned in the opposite direction, the sash is forced against the glass and secures it in the position desired. A spring under the window helps to raise it. The almost universal form of scuttle dash is employed which is semi-flexibly attached, there being



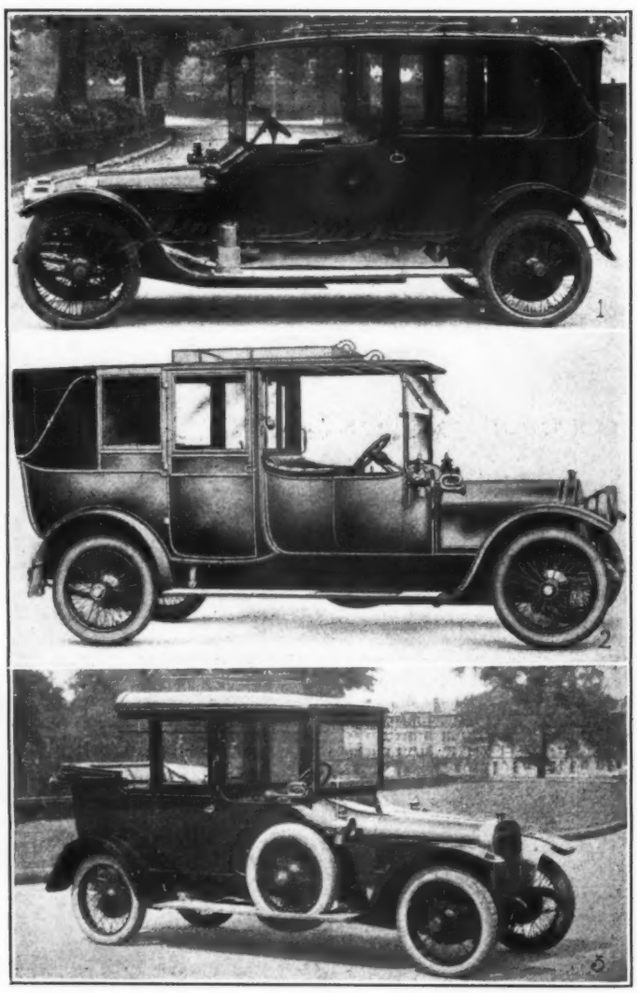
Dash fittings on Siddeley-Deasy
Detachable upholstery on Fiat body
Orderly tool kit on Hispano-Suiza



Phoenix three-passenger runabout—Interior fittings on Mulliner body



Crossley-Shelsley streamline Roadster



1—Panhard 15-horsepower standard landaulet
2—Wolseley 16-horsepower limousine landaulet
3—Good example of streamline landaulet construction

strips of soft rubber about 1-4 inch thick between the scuttle and chassis hood or dash-board and the bolts that secure the scuttle pass through soft rubber sleeves; this is to prevent rattling or squeaking. The upper parts and roof are panelled with fine inlaid mahogany; there are two inlaid mahogany companions arranged just behind the doors on either side.

On the same stand was a sidelight cabriolet body, mounted on anti-vibrant pads. A novel feature is that of an adjustable rear seat cushion. The back of the seat cushion in the tonneau is hinged to the bottom of the back cushion, and the seat cushion may be pulled forward so that the incline of the back cushion may be regulated; there also is an adjustment whereby the front of the seat cushion may be raised to various heights to regulate the incline of the seat cushion; thus the seat may be readily adjusted for the comfort of its occupants.

Prominent Automobiles Exhibited at Olympia

DeDion Builds Fours and Eights—Lanchester Uses Steel Pistons—Napier Adds Inclined Valve Stems

PERHAPS the most interesting point to be noticed in connection with the 1914 De Dion cars is that only four-cylinder and eight-cylinder models will be built, the smallest of these replacing the small twin-cylinder model that has been built for many years.

The 8 horsepower engine, Fig. 2, 56 by 120 millimeters, has the two-bearing crankshaft very stiff with a diameter of 35 millimeters. The cylinder block has no water space between the cylinders. Cast steel pistons are used, of which the bosses are placed very low in the skirt and extended for the set screws used to secure the gudgeon pins. Each piston has two rings. No provision is made for the adjustment of the valve tappets, and it is not easy to see, save on the score of economy, why this is so; perhaps it is considered that if the ends of the valve stems and the tappets are hardened sufficiently that inappreciable wear only takes place in a number of years.

The exhaust and inlet have a diameter of only 20 millimeters and presumably this is done with the idea that it is possible to get all the power necessary for ordinary touring with a small valve, which at the same time prevents the engine being overdriven. One of the chief merits of the De Dion designs has always been that the cars produced are extremely durable, and it is not, therefore, surprising to find certain parts of the design especially altered to retain this feature. Another remarkable feature is that the valve caps instead of being removable by one spanner require two separate spanners, one for the inlet cap and one for the exhaust, whereas both caps might well have been identical in this respect.

Oil is forced to all motor bearings, except those for the gudgeon pins, which, together with the cylinders, are lubricated by the oil spray. The pump is of the spur type, and there is a pressure regulating device which is in a position perfectly accessible. The oil level indicator is combined with the tap for draining off surplus oil from the sump. It consists of a small tap with a hollow shaft carried up to a handle. Through the center of the hollow shaft there is a graduated rod, of which the milled end can be seen immediately above the handle. All oil is returned to the pump after passing through the gauze filter which stretches from one side to the other of the sump and is removable only when that part of the engine has been detached.

The 14 horsepower engine has block cylinders 75 by 130. A two-bearing crankshaft is used with 47 millimeters bearings

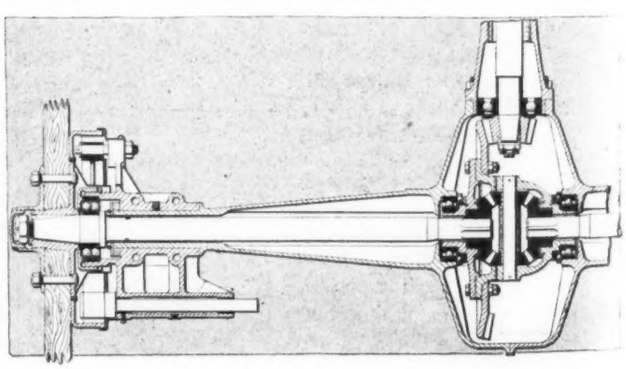


Fig. 1—Section of De Dion 8-10 horsepower rear axle

The front one is 60 millimeters long and the back one 98 millimeters, the total bearing surface therefore is not very great and evidently the most suitable material and thoroughly efficient lubrication are relied upon for providing good wearing qualities. The crankpins are 45 millimeters in diameter and 58 millimeters long. In this motor three piston rings are fitted and the piston length is 85 millimeters; the length seems rather short for the stroke, but the connecting rods are of good length. The valve guides are exceptionally long, 105 millimeters, and are driven into the cylinder casting from the underside.

The camshaft is chain driven and the arrangement of the drives is as follows: After passing round the driven wheel Fig. 5, the chain driving the camshaft is taken over a small jockey sprocket mounted upon an eccentric, so that the tension may be adjusted when the timing gear is being assembled or when necessitated by wear. The adjustment of the other chain is effected through the oil pump casing, which is mounted upon a flange and held to the base chamber by four bolts. These four bolts pass through slots in the flange, and consequently it is only necessary to slack them back in order to move the whole oil pump downwards, thereby altering the distances between it and the crankshaft and adjusting the chain. Special precautions have been taken to prevent oil working out of the crankcase, there being what may perhaps be termed a small fan when mounted upon the rear end of the crankshaft; this revolves with the crankshaft and by centrifugal force throws any oil which may creep along the shaft to the sides of the crankchamber whence it runs down to the sump through a special duct.

On the 26-horsepower eight-cylinder engine a two-bearing crank is employed with a single crank for opposed cylinders, one connecting rod taking a bearing upon another, and the full length of the big end bush taking the load from both. Most of the constructional details are similar to those described.

A single camshaft, Fig. 3, is used for both blocks of cylinders, and it carries sprocket at one end for driving the magneto and air pump, and a double sprocket at the other end for the chain drive and the distribution chain to the fan. The arrangement makes a very neat cam gear, and also permits the various accessories to be placed in accessible positions. The air pump and the magneto are secured to the base chamber at the back of the carbureter and above the flywheel. The air pump, following modern practice, is designed so that no pressure relief is needed, that is to say, the compression space of the pump will not permit a greater pressure than that required to force gasoline from the tank to the carbureter.

The 8-10, 12 and 14 horsepower models are built with bevel drive from propeller shaft to differential and live rear axle. The axles are of rather similar construction to the 8-10, Fig. 1. The propeller shaft of this model is particularly heavy, having a diameter of 35 millimeters. The tooth width of the bevel and crown wheel is 28 millimeters. A double ball bearing is provided close to the driving pinion. The axle has a diameter of 25 millimeters and there is a single double-purpose ball bearing to

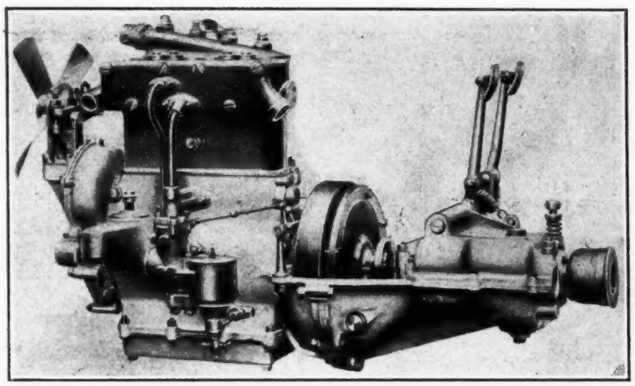


Fig. 2—De Dion 8-horsepower motor, 56 by 120

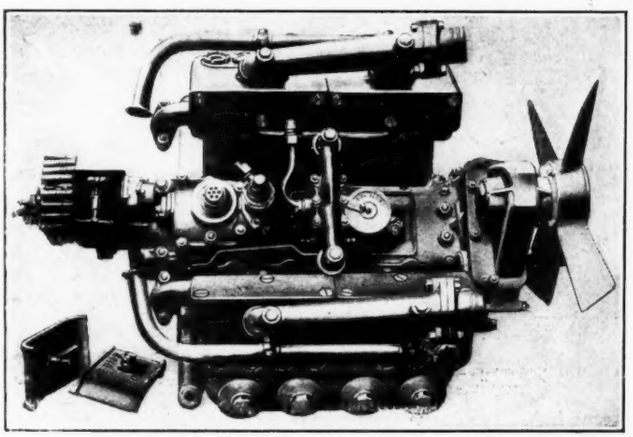


Fig. 3—Eight-cylinder De Dion, showing carbureter arrangement

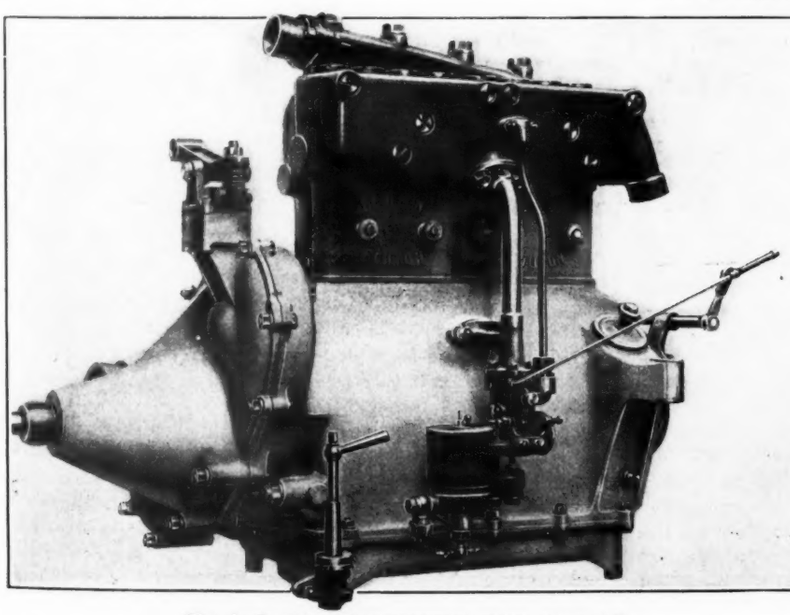


Fig. 4—De Dion 14-horsepower motor, 75 by 130

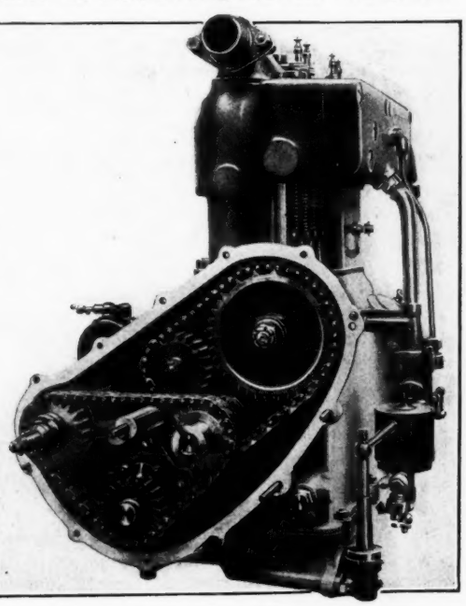


Fig. 5—Chain drive on 14-horsepower De Dion

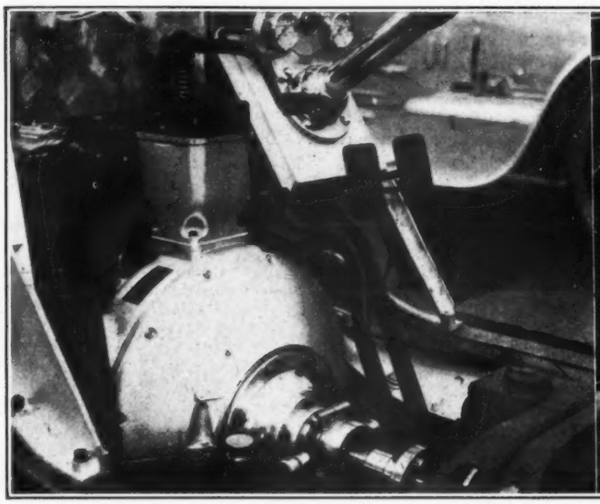


Fig. 6—U. S. L. starter on Sheffield-Simplex Six

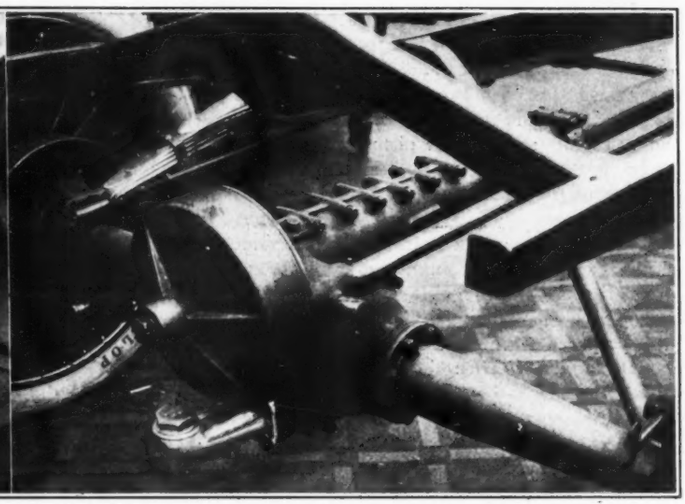


Fig. 7—Internal footbrake on Siddeley-Deasy

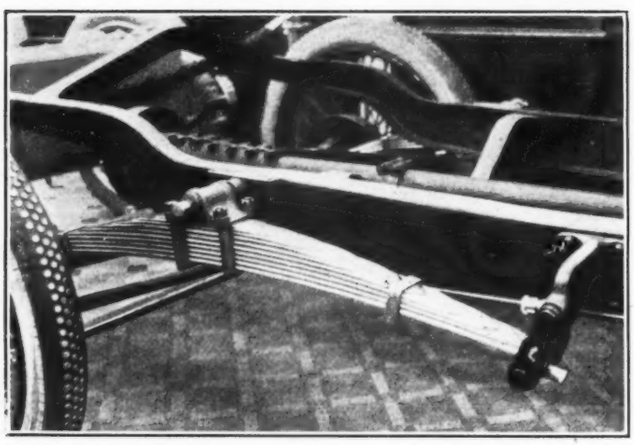


Fig. 8—Rear spring on Siddeley-Deasy

each hub. The brake drums have a diameter of 210 millimeters and the brake shoe width is 28 millimeters. There is a neat arrangement for lubricating the hub bearings. A hole drilled from the axle end and fitted with a screw plug communicates at its inner end with a space behind the bearing; the hubcap and plug on being removed permit grease to be forced by means of a grease gun into the bearing.

Lanchester Uses Stamped Pistons

The characteristic Lanchester design of chassis which is the most unique in Europe is continued in 25 horsepower four-cylinder and 38 horsepower six-cylinder models, both using the wick-type of carbureter, the motor mounted between the passengers of the front seat, and so the entire body carried well between the axles, giving a characteristic easy riding that is recognized wherever Lanchester cars are owned. The Lanchester engines have horizontally disposed valves one on either side of a central combustion chamber, and these valves are operated by rocking levers which, in turn, are moved by camshafts placed one on each side of the engine. The valves are held upon their faces by flat springs in place of the usual coiled springs. The general design of the motor in other respects follows closely on the lines of standard practice. The intake manifold is arranged longitudinally on the top of the motor in order to avoid taking up more width than is necessary between the seats. An improvement has been introduced by carrying the exhaust pipe through the waterjacket, and in embodying the water circulation pipe in the cylinder heads, thus effecting a considerable simplification, both actual and in appearance.

In detail all the most successful features of the 20 horsepower engines have been adopted, pistons of extremely light design being machined from solid stampings of high-grade steel. The connecting rods are nickel steel stampings of between 30 and 40 tons per square inch elastic limit. The crankshaft is cut from the solid slab, a very tough quality of chrome nickel steel being employed. The cylinders are of a special mixture of cold blast iron, whereby the maximum of durability is ensured, the cylinder bore being ground internally dead accurate on a special machine.

With regard to the lubrication, a gear pump carried off a bracket on the interior of the crankcase and driven direct off the crankshaft by a spiral gear wheel sucks oil from the base of the crankcase and delivers it under several pounds pressure by a distribution pipe to the main bearings. The oil, besides lubricating the bearings, finds its way by the holes drilled through the crankpins to the connecting rod big-end bearing, and thence to the small end, the connecting rod shank itself being drilled to form an oil conduit. The cylinders are lubricated by the oil continually thrown off from the crank bearings, over lubrication being prevented by a piston ring at the lower extremity of the piston. The cams and camshafts are supplied with lubricant from an external source and the cam boxes are designed to serve as baths in which the cams run immersed in oil.

An electric starter has been adopted and is mounted at the side of the power unit, and at its rear end an encased driving chain transmits the power to rotate the dynamotor from the end of the gearshaft. When acting as a motor a sliding shaft moves a pinion into mesh with a milled steel ring on the flywheel. By means of the control switch a 32-volt current is obtainable for starting the engine, and an 8-volt current for the lamps. The starting lever is brought to a convenient position beside the driver's seat.

Siddeley-Deasy Uses Cantilever Springs

In the new Knight type 14 horsepower Siddeley-Deasy the engine is the same size as last year's model but the cylinders are cast in block. The transmission gear is built up into one unit, the gearbox and rear axle being mounted on opposite ends of a stout torque tube, and supported on the frame at the forward end of the gearbox by means of a large spherical joint. The final reduction is effected by means of a worm gear of the hollow or globoid type, the worm being situated above the wheel. The difficulty of placing the footbrake on the gear shaft has been overcome by prolonging the worm shaft out through the back of the axle and fitting to it a brake drum having internal shoes of the same type as those fitted to the road wheels.

The rear springs are of the cantilever pattern, a type used on the Siddeley-Deasy for several years. The radius rods,

however, are necessarily absent, the control of the axle being effected through the central torque tube. The torque tube is well braced to the rear axle by diagonal stays, these stays being mounted in ball joints so as to ensure the absence of any strains through incorrect alignment.

An electric engine starting device is installed in connection with the electric lighting set. The dynamo is situated at the front end of the engine. An electric motor is fitted at the side of the frame behind the flywheel. Through a leather disk universal joint the motor drives a shaft, on which is mounted a slidable sleeve carrying a small gear pinion, which can be moved into or out of engagement with a toothed flywheel ring.

Wolseley Uses Separate Cylinder Heads

The Wolseley chassis remain in all details the same as they have been during 1913. In the 30-40 horsepower engine the valves are inclined at an angle in order to reduce the volume of compression space. Silent chain camshaft drive is used. The chain gear runs in an oil bath constituted by the timing gear case, the oil supply being maintained by oil jets over the chain. An eccentric arrangement is provided for the adjustment of the chain gear.

The cylinders are cast with open tops. The openings are closed by the valve-like pieces, the stems of which pass through dogs resting on the upper side of the top cylinder wall, and are threaded for clamping nuts. These stems also pass through each water outlet trunk, which in turn is held down by other nuts.

The lubrication is maintained by an oil pump which takes the form of the usual gear wheel type driven off the camshaft, and it delivers oil through a distributing pipe carrying the oil to troughs above the main bearings. The same pipe carries the oil to a jet over the timing gear and to an adjustable screw and an oil indicator on the dashboard. From the pump the oil also flows to troughs under the connecting rod big-ends. The oil is drawn by the pump from the sump up to a cup in which is contained an oil strainer.

The engine starting apparatus takes the form of an air pump driven off one of the gearbox shafts.

The four-speed gearbox has the constant-mesh wheels rather narrower than is usual, the tooth width being three-quarter inch. The wheel teeth throughout the box vary in width from three-quarter inch to 1 inch, this latter being the dimension of the first speed pair of gears. The distance piece that separates the bearings of the driving shaft has a V oil-thrown collar upon it and there is a felt packed cover at the front end of the shaft.

The layshaft is of circular section 1½ inches in diameter, and the driven shaft is a castellated one. The constant mesh wheels have on the driving shaft eighteen teeth and on the layshaft thirty teeth. The third speed gears are layshaft, twenty-five teeth and driving shaft twenty-three teeth. The second speed gears are layshaft twenty teeth and driven shaft twenty-eight teeth, while to the first gear there are fifteen teeth on the layshaft and thirty-three teeth on the driven-shaft wheel. All the wheels are 6 pitch. A peculiarity lies in the fact that while at the forward end of the layshaft there is the usual single ball journal bearing at the rear end, close to the gears giving the greatest reduction ratio, there are two ball bearings to the layshaft.

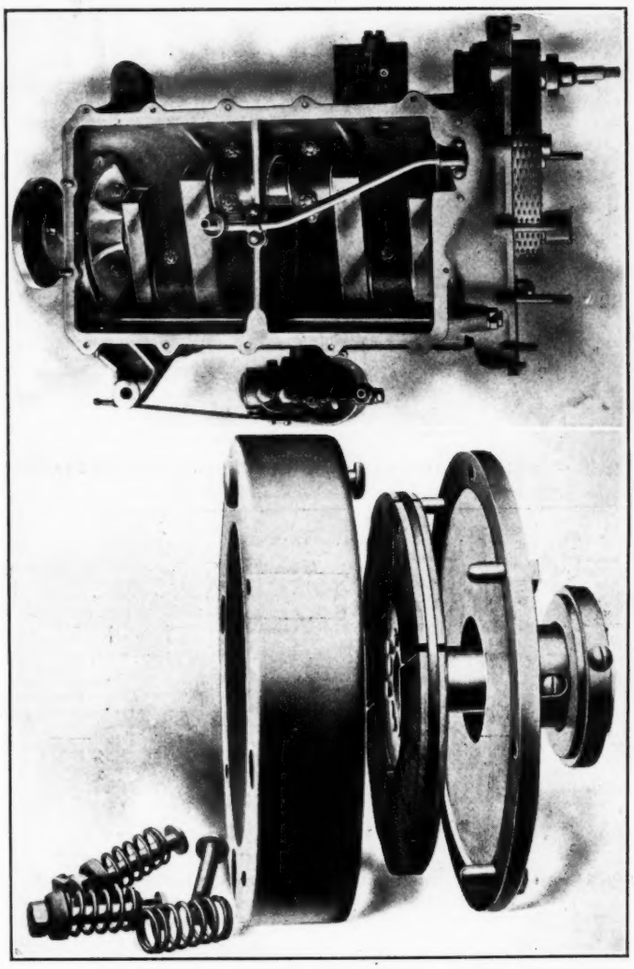


Fig. 9—De Dion 14-horsepower motor, showing oiling arrangement
Fig. 10—De Dion plate clutch in assembly

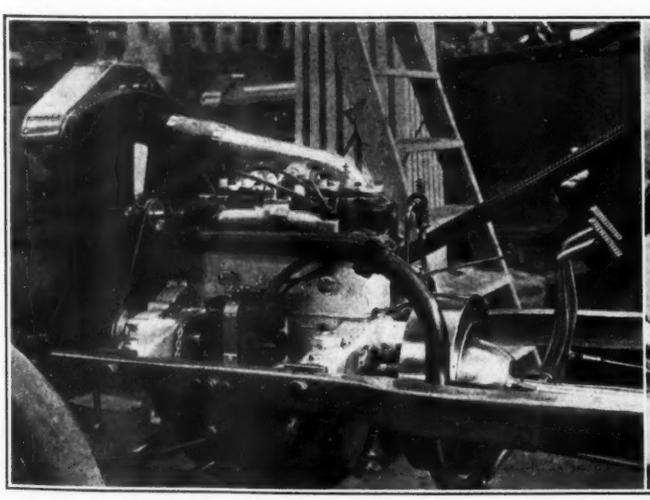


Fig. 11—Dynamo mounting and drive on Singer

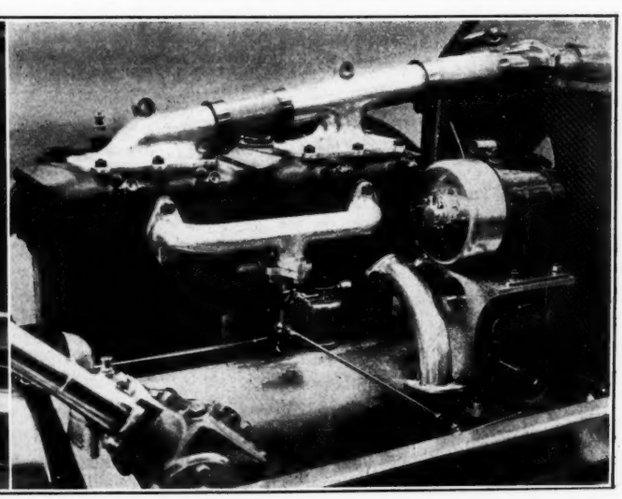


Fig. 12—Swift dynamo mounting on bracket over magneto

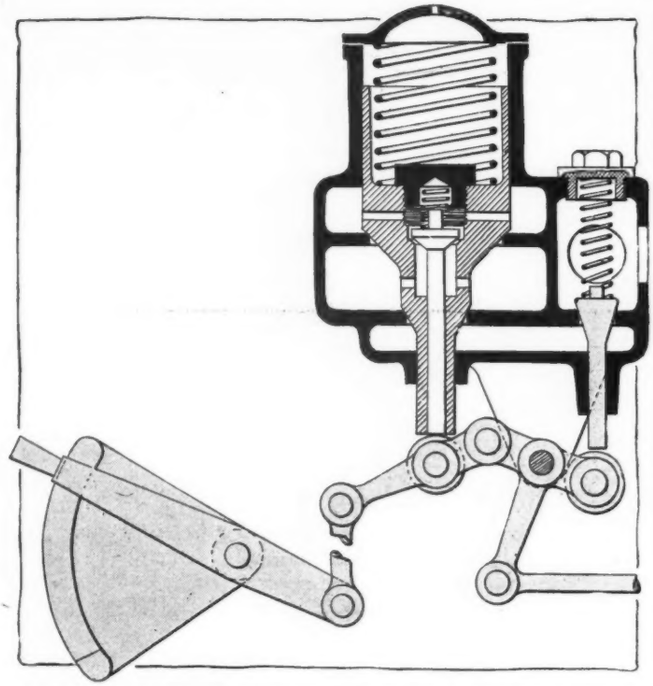


Fig. 13—Novel carbureter arrangement by the Albion Motor Car Co.

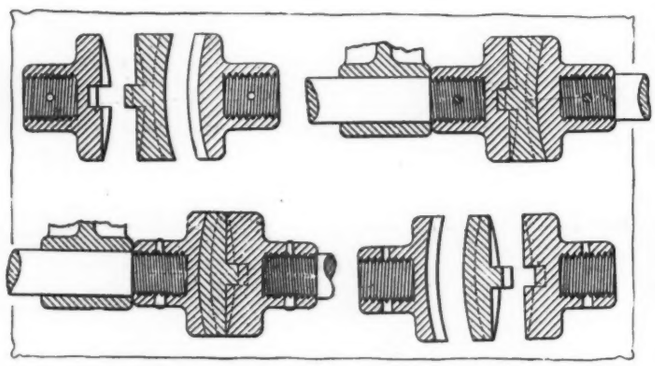


Fig. 14—An interesting universal coupling by Armstrong-Whitworth

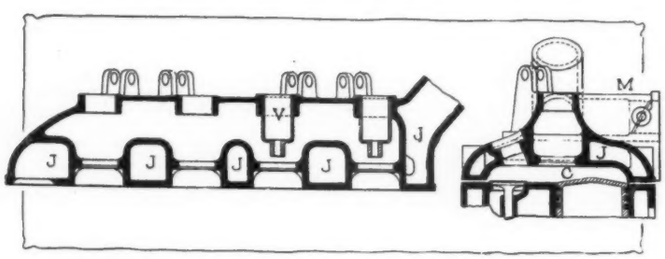


Fig. 15—Wolseley cylinder head for multi-cylinder engine

Napier Uses Inclined Valves

The most interesting Napier is the 30-35 six-cylinder. In the motor 3½ by 5 inches the designers have aimed at securing maximum efficiency by attention to the shape of the combustion chamber and in order to keep this as compact as possible the valves have been inclined so that the valve heads are nearer to the engine center line than the stems.

Vauxhall's Accessible Carbureter Control

In the 25 horsepower Vauxhall the piping from the oiling system is now cast as part of the crankcase and the steel tubing used is first filled up and then placed in the mould, thus there is no possibility of leakage through blow holes. The exhaust manifold has a gradually increasing diameter towards the outer

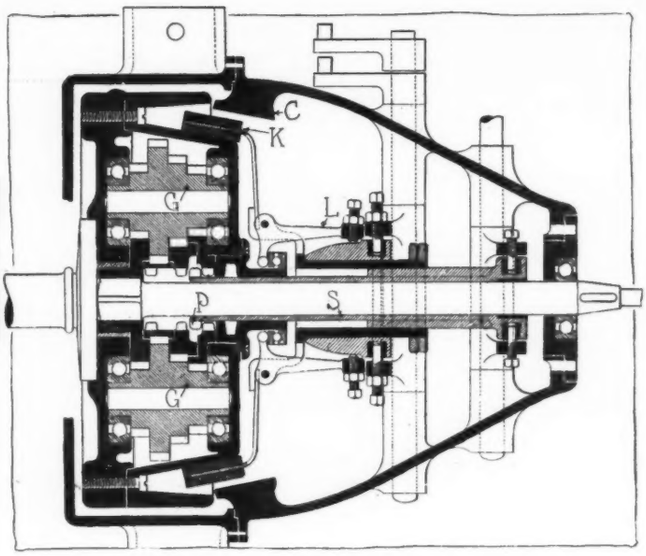


Fig. 16—Change speed gearbox used on the Henriod cars

end and has a continuous flange that is faced and studded to the cylinder casting. The water pump is arranged in such fashion that in the event of failure of the belt that drives it, thermo-syphon cooling will take place.

Beneath the carbureter is a small extra air valve controlled by a lever operated from a lever in the center of the steering column. The belt that drives the fan is adjustable as to its tension; the belt pulley is in two pieces and the sides of the groove can by means of a knurled edge be moved closer together or further apart. Detachable wood wheels are fitted.

Armstrong-Whitworth Universal Coupling

On the Armstrong-Whitworth cars is a new universal coupling which consists of a flange formed on the end of each of the shafts to be coupled, Fig. 14, and between these flanges is placed a connecting disk having two projections, one on each face, at right angles to each other which projections engage and are capable of sliding in corresponding grooves in the flanges. The faces of the disk and the faces of the flanges with which they engage form parts of cylinders whose axes pass through the point round which the bearing swivels and are at right angles to each other.

Henriod's Flywheel Gearset

A typical example of the effort to combine a planetary gearset with a flywheel is that of C. E. Henriod which consists of a construction of change-speed gear which is combined with the clutch, the whole apparatus being placed in an extension of the crankcase. All the ranges of speed required are brought about by moving one pinion, P which is fitted on a long sliding sleeve S.

The clutch flywheel has housed in it planetary pinions G forming part of the gear, and the clutch plate K, acting with the flywheel, is adapted either to engage the flywheel in order to obtain a direct drive, or to be locked to the outer cover C in which case the various changes of speed can be made. The clutch plate is operated by means of bell-crank levers L and a conical sleeve, the sleeve being attached to the operating pedal in such a way that it can slide on the central shaft.

Wolseley Detachable Cylinder Heads

The Wolseley company looked upon as one of the leading engineering concerns has taken a step in advance in its detachable cylinder heads, a design which is receiving much attention at present.

A removable head, formed as a single casting, is common to both or all the cylinders of the engine, and this head comprises the combustion spaces C, Fig. 15, the seatings V and guides for the

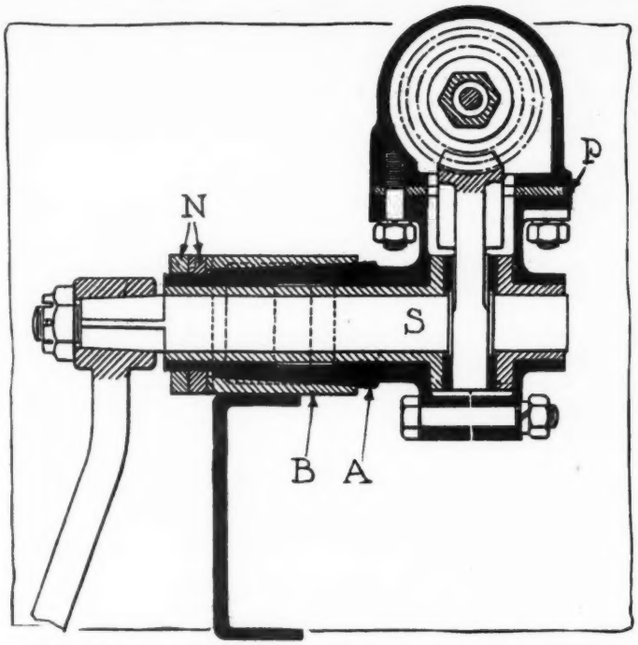


Fig. 17—Peugeot steering gear with adjustment for angle and wear

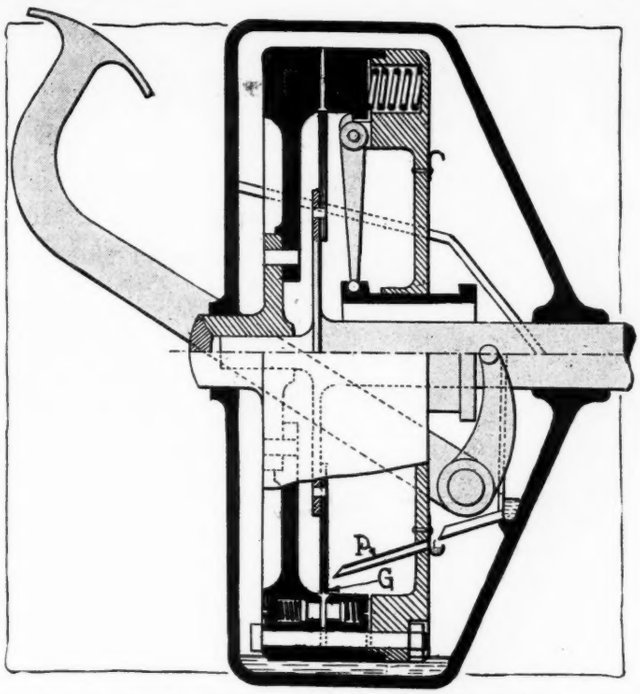


Fig. 18—New inclosed disk clutch used on the Panhard car

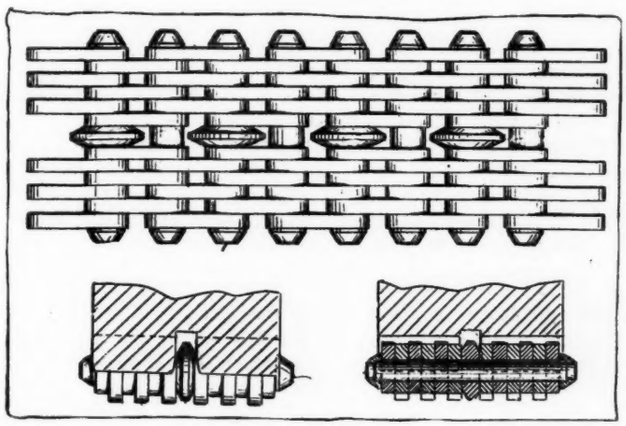


Fig. 19—Improved silent chain put out by the Renold company

inlet valves located in the cylinder head, the intake manifold M up to the point of connection with the carbureter, and the water jacketting J for the cylinder heads including the passages which are in communication directly with the cylinder jackets and the passage which is in communication with the radiator. The construction of a common head embodying these features reduces the cost of manufacture, both in casting and fitting, and preferably, the head is adapted to carry the sparking plugs, the throttle valve, and the pivot brackets for the levers which operate the induction valves.

The casting is certainly a little intricate and in the case of a slight breakage would be expensive to replace, but no doubt the first cost of production is lessened by the arrangement of design shown.

Panhard's Inclosed Clutch

A good example of the latest European practice of inclosing the disk clutch is that of Panhard & Levassor. The entire clutch Fig. 18, is inclosed in a casing so that oil escaping is caught. A number of spring-operated tappets are provided round the edge of the flywheel. These tappets ensure the disengagement of the disk when withdrawal of the clutch is desired by forcing apart the oil-covered surfaces in contact due to the capillarity of the oil. Oil supplied by the pipe P shown finds its way by centrifugal force into the annular grooves G upon the flywheel and its casing; this oil eventually is thrown into the small groove between the disk and flywheel and on disengagement of the clutch passes between the friction surfaces ready for use on the next engagement.

Albion Carbureter Control

Improvements in carbureter control are met with in many places, and the arrangement of the Albion is one of the most interesting. The arrangement consists of a controlling valve in which the air valve and the gas valve are of the mushroom type, and are mounted concentrically on the same spindle. In the construction, Fig. 13, an air-inlet valve is shown on the right and the combined valve on the left. The air enters through the valve on the right and passes downwards into the conduit at the bottom of the casing. It then passes out upwards through the lower of the two concentric mushroom valves to the intermediate conduit through which the gas is supplied. The mixture then passes on and upwards to the upper conduit through the upper and larger of the concentric mushroom valves which therefore acts as the main throttle valve.

Peugeot Adjustable Steer

Peugeot cars are using steering gears which are adjustable for wear and which can be mounted at different angles to suit the requirements of different drivers. In this gear, Fig. 17, the exterior surface A of the bearing in which the sector shaft S rotates is tapered and fits into a bracket B attached to the frame having a taper hole to receive it. A couple of nuts N screwed on to the exterior part of the bearing at the bottom of the taper serve to retain the gear in any position in which it may be placed. Packing pieces P are inserted between that part of the casing that holds the sector and the part which holds the worm. The two parts are bolted together and when wear takes place the packing piece may be taken out and its thickness reduced.

Renold's Improved Chain

Hans Renold has an improved type of silent chain for camshaft drives, Fig. 19. In place of the usual type of guide link to retain the chain in position upon the chain wheel, disks or washers are used. These disks cause the wear on the sides to be distributed evenly round the whole circumference. Such even wear is not obtainable in the case of the usual guide link. The arrangement facilitates each series of chain links, being composed of an equal number of chain links of equal tensile strength, thus making the chain throughout of even strength and elasticity.

Why Packard Uses Three-Speed Gearset

Together with a Defense of Its Characteristic Rear Construction Employing the Location of the Gearbox on the Rear Axle

By S. D. Waldon
Vice-President Packard Motor Car Co.

VERY few users of motor cars have the inclination or the time to analyze the elements effecting the transmission of engine power into car-speed, or car activity, yet there are certain fundamentals with which the average user should be conversant in his selection and operation of a car.

Motor development has progressed through all the stages, from the early, inefficient, single-cylinder, with its excessive vibration at all speeds, to the present-day highly-efficient six-cylinder, which is practically free from vibration at any speed.

Strange as it may seem, this problem of overcoming engine vibration has had a powerful effect upon gearsets and upon the direct-drive ratio between the motor and the rear wheels.

The public has demanded a direct-drive ratio capable of handling all ordinary grades without shift of gears, and of handling the vehicle smartly in traffic. Low-geared cars, with unbalanced engines, become unbearable at speed, and consequently the manufacturer was at his wits' end to effect a compromise between these two difficult extremes of low-gear ratio for greatest activity at moderate speeds and freedom from vibration at maximum speeds. It has been the demand for this compromise which has made necessary the motor development from the original one-cylinder through all the variations up to the present six.

Reducing Engine Vibration a Problem

This problem of engine vibration was met by different manufacturers in different ways. Practically all in the beginning geared their cars high, in order to secure slow engine-speed at ordinary car-speeds, but this decreased activity, though it added to maximum speed under favorable conditions. Along with others we geared our cars around 2½ to 1, whereas, in order to meet the present-day standard of pick-up and activity, practically all cars have to be geared between 3½ and 4½ to 1, with only the very highest-powered motor carriages carrying a gear of 3 to 1.

Some makers concentrated all their energies upon the reduction of vibration to its lowest possible terms, while others went directly to the introduction of an indirect fourth, into which the operator could shift when he could stand the vibration no longer, and preferred noise and loss of efficiency instead.

The steadying influence of the mass of automobile users has placed the value of excessive speed on rare occasions at a much lower level than that of activity under normal conditions of everyday use. Low gearing gives more engine impulses per turn of the rear wheel, which, of course, means more power available for the hill, the heavy going or the pick-up in traffic.

This demand for activity at the ordinary driving speeds has resulted in the establishment of a fairly definite relation between the ability of the more popular cars in each class. Up to the limit of its capacity each car should start from a standstill and accelerate alike to the limit of its ability. The smaller the engine the sooner it would reach its limit, while the larger the engine the greater its range of speed and the greater the distance and time through which it would maintain the standard measure of acceleration.

To obtain the standard measure of activity, different direct-drive gear ratios are necessary. They vary with the size of the engine, the diameter of the rear wheels and the weight of the vehicle.

There are many who confound gear ratio with horsepower. Horsepower is related to bore and stroke, while gearing simply determines the number of engine impulses that will be measured out for each turn of the rear wheel.

A small engine may be geared down so as to bring to bear upon the rear wheels enough more impulses of the small piston to equal in power value per turn of the rear wheel the fewer number of impulses of the pistons of a larger engine. Because both the cars, one with a small and one with a large engine, climb the same grade with the same weight and at the same speed is not an indication that the smaller cylinder is as powerful as the large cylinder, but that the gearing permits it to make more revolutions and, consequently, to deliver enough more impulses of a lower value to equal in total the fewer impulses of greater value of the larger engine.

It is possible by proper consideration of engine power available, diameter of the rear wheel and weight of the vehicle to select a gear ratio that will give this standard of activity or measure of acceleration up to the limit of the motor's capacity.

For convenience this measure of activity on direct drive will be called 100 per cent.

The most direct and practical application of engine power to the rear wheels is through the medium of a single pair of bevel gears. All forms of gearing waste, in friction of the gear teeth and supporting bearings, some of the power to be transmitted. Every additional gear that is introduced into a line of power transmission absorbs some of the power in friction. When we introduce an indirect fourth, or second, or first speed, we introduce four extra gears in addition to the final bevels, and have six gears in the train, instead of only two. We are adding to the loss of the driving bevels the loss in four spur gears and their bearings.

When you transmit power through any kind of gears you leave some of the power in the gears. The more gears power is transmitted through the more power is left behind.

Ascertaining the Correct Ratio

Experience on the road has shown that the introduction of four spur gears in the line of power transmission makes necessary a ratio approximately 30 per cent. lower than the high, in order to do just the same work at ordinary road-speeds, or a ratio of about 40 per cent. lower to make the stepped-down ratio sufficiently more active to be generally effective. Expressed another way, an indirect ratio to climb a certain grade in just the same manner as the direct drive would climb it would have to be about 70 per cent. of the direct-drive gear ratio, and to be able to climb a steeper grade than is possible on the direct drive would require a ratio not greater than 65 per cent. and preferably near 60 per cent. of the direct-drive ratio.

Expressed still another way, if a high-powered car is geared 3 to 1 in order to give the measure of activity at ordinary speeds which we call 100 per cent., and a grade is found slightly steeper than it is possible to take on this 3-to-1 gear, and assuming that

the next speed below the high gear is obtained by the introduction of four spur gears, then the ratio of engine turns per rear wheel turns must be not less than 5 to 1 in order to give enough more activity than the high gear to be effective.

For ready reference the following figures are given as indicating what the ratio should be for the speed below high.

High Gear	Ratio for Next Indirect Speed
3 to 1	5 to 1
3¼ to 1	5.4 to 1
3½ to 1	5.8 to 1
3¾ to 1	6.2 to 1
4 to 1	6.6 to 1
4¼ to 1	7 to 1
4½ to 1	7.5 to 1

In each case the ratio below the high gear is 60 per cent.; in other words, the ratio is such that the car will travel, with the same number of engine turns, 60 per cent. as far, or 60 per cent. as fast.

We have driven cars of all kinds and with every kind of gearbox and ratio, and from laboratory experiments and actual use know that 60 per cent. of the high-gear ratio is the highest point at which the indirect gears can be figured, in order to give enough greater activity and ability than the direct drive to be effective in everyday use.

It is quite possible that the layman, if asked how the ratios should be divided in a three-speed gearbox, would think "even thirds" and say "100 per cent., 66 2-3 per cent. and 33 1-3 per cent.," and likewise of a four-speed box would think "even fourths" and say "100 per cent, 75 per cent. and 25 per cent.," overlooking the fact that the 100 per cent., or direct-drive ratio, has only two gears transmitting power, while each other ratio has six gears in mesh, and consequently is much less efficient.

"Even thirds" or "even fourths" would be all right if every speed had the same number of gears to transmit power through, but when a drop is made from a direct drive with only two gears in the line to an indirect with six gears in transmitting, the drop must be greater in order to take care of the loss in the four extra gears.

In the earlier days, when motors were not as flexible as now, when carbureters had very little range, and when it was desirable to keep both operating at practically a constant engine speed, four-speed gearsets were designed with the ratios spaced evenly, disregarding the frictional loss of the extra spur gears. It was more necessary to keep the engine operating at a constant speed than to secure the greatest efficiency from the gearset.

An indirect speed ratio of 70 per cent. of the direct drive is approximately only just equal to the direct drive in hill-climbing ability, or is less active, depending upon the general efficiency of the transmission. To such an extent is this fact recognized that we find such well-known manufacturers as Argyll, Benz-Sohme, Darracq, Delauney-Belleville, Fiat, Itala, Lancia, Leon Bollee, Mercedes, Panhard, S. C. A. R., S. C. A. T. and Standard using four-speed gearboxes, with a third-speed ratio varying from 59 per cent. to 66 per cent. of the direct drive ratio, while the average second speed of thirty-one three-speed gearsets of prominent American makers is 59 per cent.

Small Difference in Average Ratio on Low Gear

As to the low gear, there is even less difference, the average of all the domestic and foreign cars using four-speed gearboxes showing a low ratio of 27 per cent., while the thirty-one American users of three-speed boxes show the low ratio to be 30 per cent. of the direct drive.

A question that immediately suggests itself is: If the high-gear ratio that we have called 100 per cent. is set for us by the public's demand for a certain measure of activity, and the next lower step that is practical is between 59 per cent. and 66 per cent. of the high gear, and if both four and three-speed advocates average 27 and 30 per cent. for the low gear, then is there any necessity for an intermediate speed in between the 27 and 30 per cent. low and the 59 or 66 per cent. second?

In these days of flexible motors there is certainly no value in an indirect ratio between 65 per cent. and the 100 per cent. direct drive—or above it—unless it be to lessen the vibration of a four-cylinder engine. It is no longer necessary to introduce a third speed of approximately 75 or 80 per cent. on account of a limited carbureter, valve-timing or ignition range.

The introduction of two ratios of approximately 45 and 75 per cent. in place of the one 60 per cent. simply means that the higher of the two is less active than the direct drive, and that whenever the work is too much for the high gear it will be necessary to drop past it to the 45 per cent. ratio to secure the necessary increased activity.

The 75 per cent. ratio, consequently, is carried along for no sufficiently useful purpose, and the three useful ratios in the gearbox are 27, 45 and 100 per cent.

It is sometimes advanced that the indirect fourth higher than the direct drive makes for gasoline economy. A moment's consideration will show you that if it is necessary to drop the ratio approximately 30 per cent. when four extra spur gears are introduced in order to have the car only just as active and able on that ratio as it is on its direct high gear, then it can under no circumstances be as active and able or as economical on an indirect gear than is equal in ratio to its direct drive.

Imagine a car with a 3 to 1 direct drive and also a 3 to 1 indirect fourth speed. By no possible freak of mechanics can the indirect 3 to 1 be as active or as economical as the direct 3 to 1, *because six gears cannot be made as efficient in power transmission* as two gears. Just the moment the motor is coupled up to the indirect 3 to 1 its throttle will have to be opened wider and more power—and consequently more gasoline—used than will be the case with a 3 to 1 direct drive.

Fourth Higher than Direct Still Less Active

An indirect fourth higher than the direct would be still less active and would require an even wider opening of the throttle to maintain the same car speed, seeming to indicate something quite wrong in the motor design at ordinary road speeds if a lower piston speed were necessary for economy.

A motor with too many carbureter restrictions and, consequently, too much vacuum around the jet at high motor speeds, with not enough spark advance with low speed valve timing, etc., might possibly show enough improvement at less revolutions per minute to offset the loss in the extra gears.

The engines of modern high-speed design need no such prop to lean upon, and the public is writing taboo upon this and upon many other complications that are hang-overs from the period when we imitated previous practice before getting our feet squarely on the ground.

The ratios used in the Packard gearbox are, in percentage, 100, 60 and 30 per cent. We have built and used progressive and selective gearsets of three and four speeds each. We have adopted and continued to use the progressive shift on account of its meeting the public's requirements in greater degree than any other. The simplest motion of which the human arm is capable is a straight pull or push. A much harder motion is the outward, sidewise movement of the hand. An inward movement is much easier. Our three forward speeds are all in a straight line, and from the neutral position the operator can go directly into low, second or reverse with one motion of the hand.

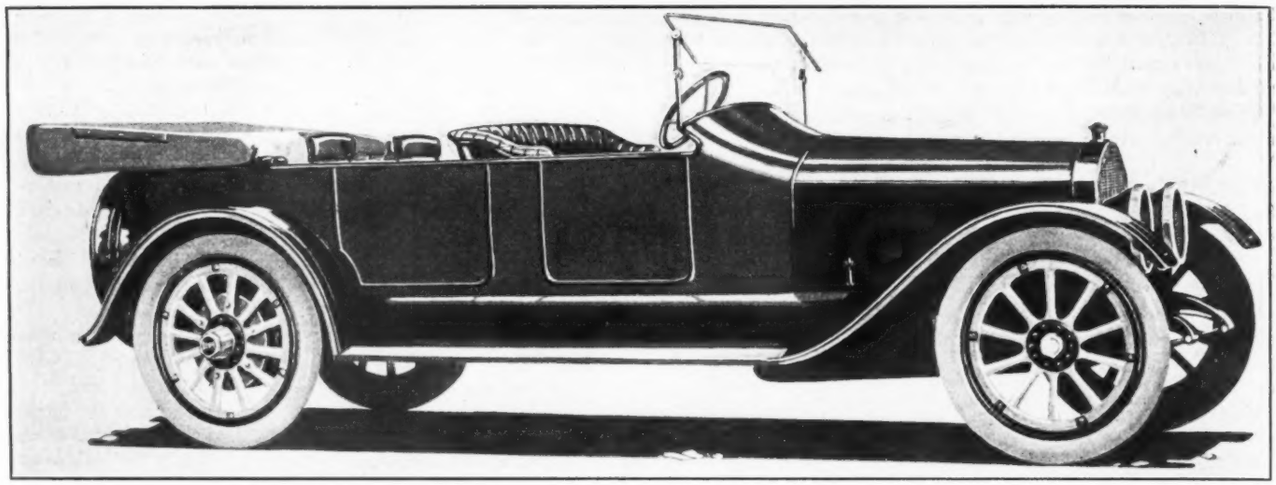
In all ordinary travel the high gear takes care of 95 per cent. of the car work, and the shift between second and high is in a direct line and simply a continuation of the shift from neutral to second.

What the public wants in motor power transmission, is:

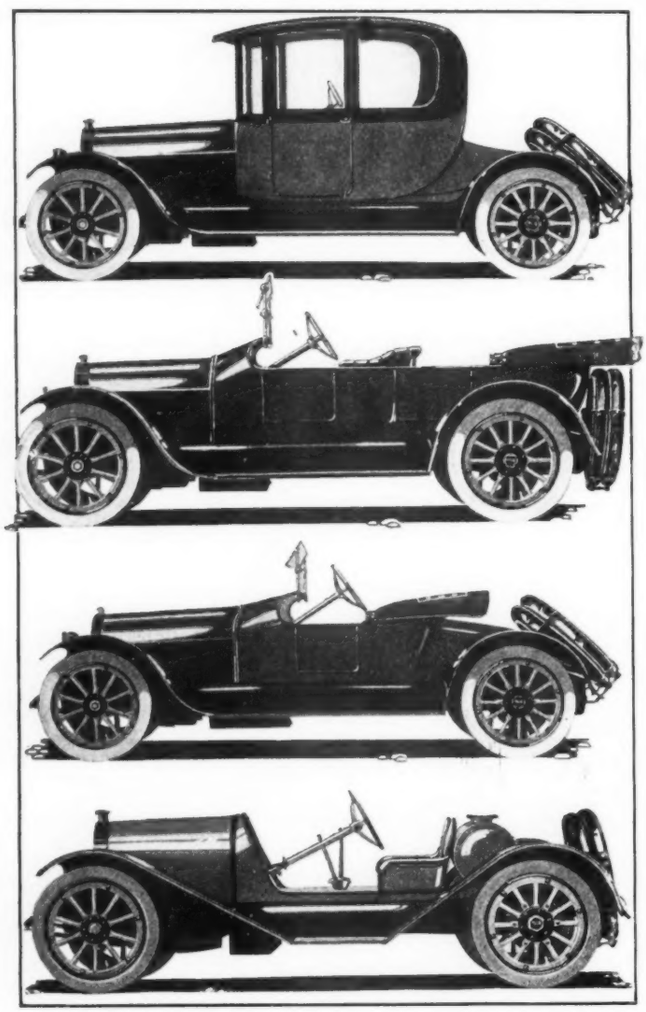
First:—Such a direct drive ratio as will enable it to handle all ordinary grades and all ordinary traffic conditions *upon the high gear* with an agreeable sense of ability and activity.

Second:—It wants such a ratio below this direct drive that when it becomes necessary to shift back out of the high there shall be a sufficiently *increased measure of activity* available to take care of such conditions as are impossible with the high gear.

Third:—It wants a ratio beyond this one, low enough to handle any grade met with on any American highway.



New Marathon 50-horsepower light six equipped with streamline body and 35 by 4.5-inch tires. Delco electric system pressure feed for fuel. The chassis of this car, fitted with complete equipment, is made in six body styles and sells as a touring car for $2,225



Top—Six-cylinder 50-horsepower coupé. Note the absence of window sash, the globular lines and the curved roof
Upper Middle—Four-cylinder Moon touring car having 118-inch wheelbase, left drive and center control
Lower Middle—Sporting roadster body mounted on the light six chassis and selling for $2,150. On the four-cylinder it is $1,750
Bottom—Parkway speedster with 118-inch wheelbase, 4.5 by 5-inch motor, left drive and center control

Moon Adds Light Six

Drops Two Four-Cylinder Models, Continuing Model 4—42

BY the addition of a new lightweight six-cylinder car and in dropping the four-cylinder model 39 and the six-cylinder model 65, the Moon Motor Car Co., St. Louis, Mo., has brought its line to two chassis, a four and the light six. The latter, which is the feature of the line, is replete in interesting developments both as regards chassis improvements and streamline body design. It is a new car in every particular. The four-cylinder car, except for a few refinements, carries the same motor as last year, but, viewed with its streamline body, will unhesitatingly be pronounced an up-to-date car in every feature.

The new six touring car shown at the top of this page illustrates the latest development of the streamline form. The bonnet line extends without a break into the gentle curve of the cowl and thence, with a quick hook, into the straight-line flush-sided body, which is characterized by broad door lines, concealed hinges, and invisible handles. Six body types are offered, having passenger capacities of two, four, five, six and seven and a three-passenger coupé. The car is strictly in the $2,000 class, the first three body types mentioned listing at $2,150, the six and seven-passenger types at $2,225 and the coupé at $2,750. Wire wheels are supplied on all models at an extra charge of $100.

Delco Electric System Used

Other features which are of interest on this car are the improved Delco system of lighting and starting which is furnished as stock equipment, a power driven tire pump and a more handsome line of equipment in the way of windshield and other accessories, upholstery, etc.

The Continental power plant used in connection with the Moon chassis is worthy of special attention, due to the fact that according to horsepower and torque charts as reproduced on page 1011, an extremely light weight per horsepower is secured. This curve develops the fact that the motor which is only 3.75 by 5.25 inches and weighs only 590 pounds shows over 50 horsepower on the actual torque dynamometer at just over 1,300 revolutions per minute. It also shows that the power curve does not fall off up to 2,000 revolutions per minute.

The motor has its L-head cylinders cast in blocks of three. The valves are all located on the right side and the intake manifold together with the latest double-jet Rayfield carbureter are also on the same side.

The electrical functions, including ignition, cranking and light-

ing are taken care of by a development of the Delco system specially adapted to the Moon cars. This equipment is in two units. The generator which supplies the current for ignition and cranking, and the cranking motor which is geared to the flywheel. For storing the current a 6-volt, 130 ampere-hour Exide battery is used, the latter member having a weight of 82 pounds. The generator is geared 2 to 1 to the crankshaft and the winding is such that it starts charging the battery at car speeds above 6 miles per hour. The rate of charge is controlled by voltage regulator, but the maximum charge is delivered at a car speed of 20 miles per hour. When the car speed drops below 6 miles per hour there is no electrical connection between the storage battery and the generator, thus preventing any possibility of the battery discharging through the generator when the latter is at rest.

The Delco cranking motor which operates at 6 volts is geared to the flywheel at a reduction of 24 to 1. The battery has been made in a long narrow shape so that it can be housed accessibly and still be out of the way. It is placed behind the apron near the front of the right fender.

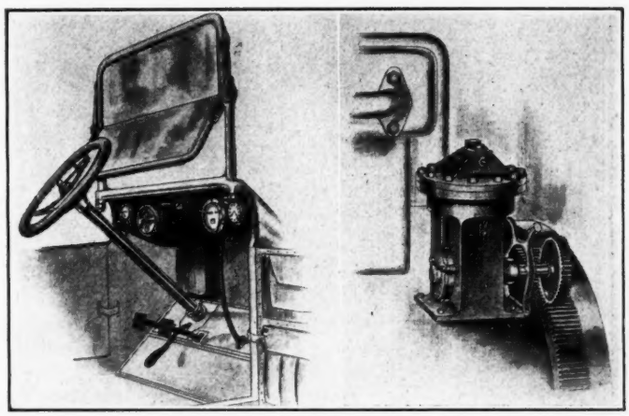
The drive is taken from the motor through a dry disk clutch to a four-speed gearbox which provides a 3.5 to 1 ratio on third or direct speed and 2.875 to 1 on fourth. The gearbox is operated in a selective manner and is located amidships on the chassis. The driveshaft carries a universal joint at each end and operates a floating rear axle housed in a one-piece steel casing which is stated by the makers to be capable of withstanding a pressure test of 15 tons. An interesting provision which is a unique piece of Moon construction is a centrifugal oil draining device inside the hub which picks up any lubricant that flows from the differential housing and drains it from the casing before it can reach the brakes and cut down their efficiency.

Pressure Feed Fuel System

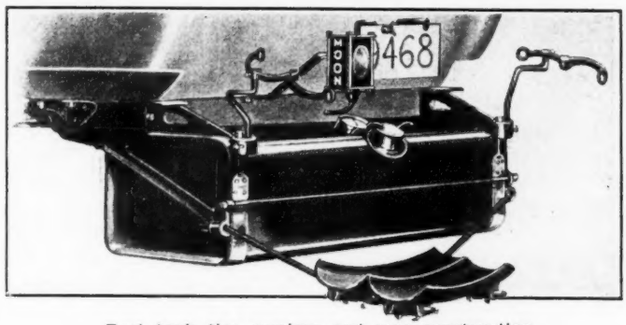
The gasoline system is a pressure feed and consists of a 25-gallon tank swung under the rear of the chassis frame. The initial pressure for the fuel feed is obtained by the use of a hand pump on the cowl, and after the engine starts to operate it is obtained from an exhaust regulator tapped into the manifold directly behind the dash.

The wheelbase of the new six is 129 inches and the tires are 35 by 4.5 inches. Lines of pleasing symmetry mark the Moon body designs for this season. The extra tires are carried on the rear and none of the accessories is allowed to break into the harmony of the body design. An example which illustrates this to perfection is the new windshield which is moulded directly into the curved line of the cowl. All the instruments on the Moon cars for 1914 are carried on a cowl board and a single

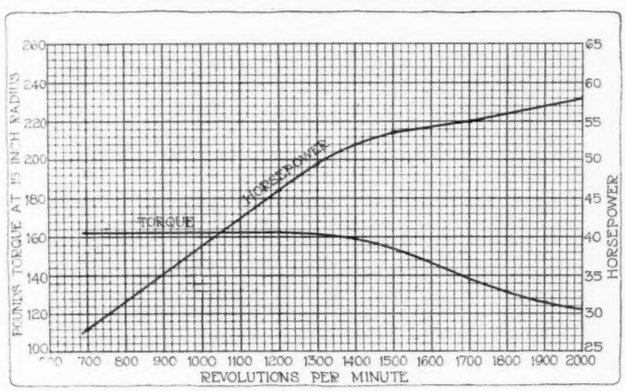
(*Continued on page* 1014.)



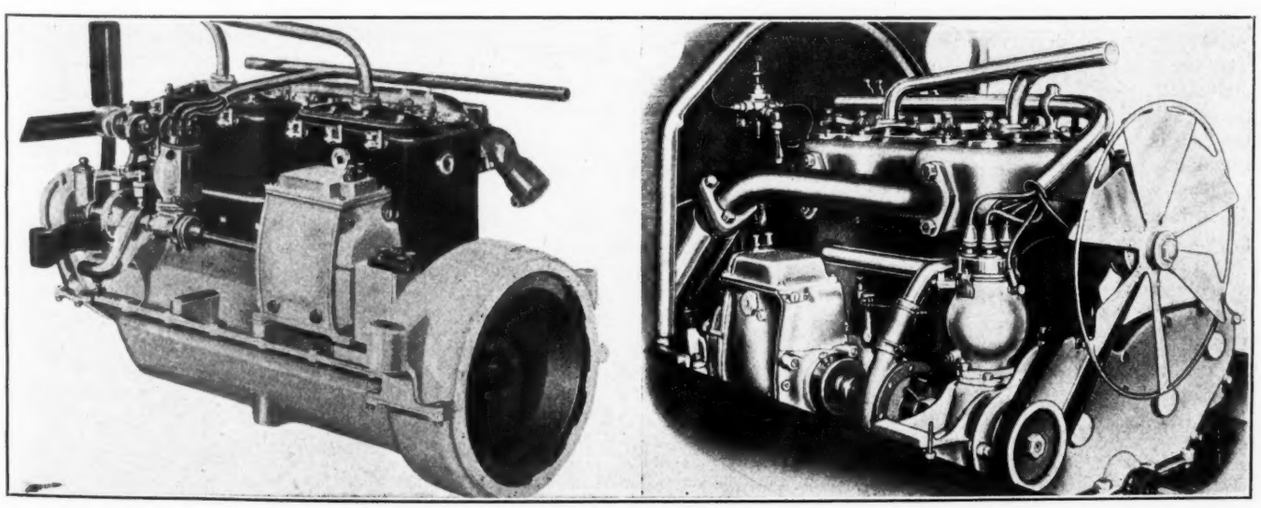
Left—Detail of Moon control. Right—Power tire pump



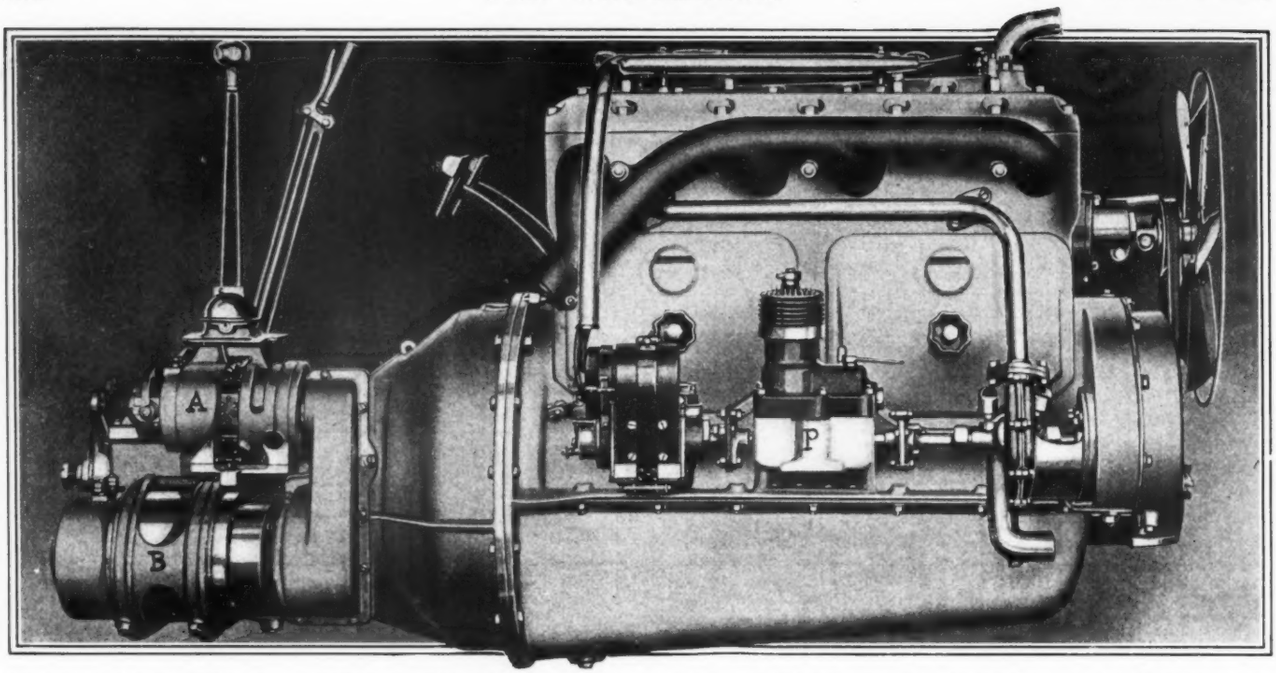
Fuel tank tire carriers and rear construction



Curve showing the torque and horsepower of the Moon light six



Left—Light six motor with the 3.75 by 5.25 cylinders cast in threes. Right—Model 42 four-cylinder motor with 4.5 by 5-inch cylinders



Equipment side of Lozier four, showing grouping of Gray & Davis cranking and lighting units on the gearbox and with water pump, tire pump and magneto driven through silent chain from the front end of the crankcase. Note central motor support

Lozier Four with Block Motor at $2,100

Generator and Starter on Gearbox —Separate Cylinder Heads—Four-Speed Gearbox—Tungsten Valves

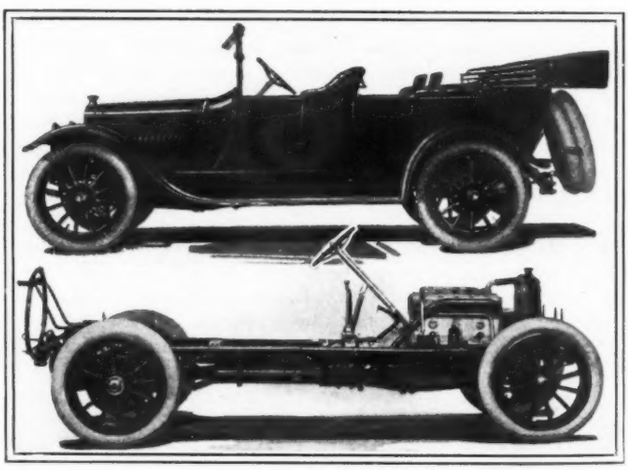
IN these days when the small six is commanding major attention and manufacturers are dropping fours and replacing them with sixes, it is quite unexpected to meet with a concern like the Lozier Motor Co., Detroit, Mich., which is returning to a four-cylinder car to sell fully equipped at $2,100. The first of these cars has actually been produced, and was shown to the Lozier dealers at their convention a week ago. This new four, together with a light six, will comprise the 1914 program.

The new Lozier four is an out-and-out new job from start to finish. To begin with it uses a unit power plant, supported at three points, which is one of the clean-cut ones of the season. The motor is of the long-stroke type, 6.5 inches, and with 4.25-inch bore, these dimensions giving a stroke-bore ratio of 1.53 and a piston displacement of 533.8 cubic inches. By S. A. E. rating it is 28.9, but the Lozier test room shows in excess of 56 actual horsepower.

The L-type cylinder casting is a neat job in that the four cylinders and the upper half of the crankcase form an integral casting, the general contour of which is shown on the intake side. The cylinder head is separate, its removal giving access to the combustion chambers and valves. It is held in place by bolts and carries spark-plugs, pressure release, priming cups, water return pipe, and conduit for the ignition wires. Between this removable head and the cylinder casting is a copper-asbestos gasket.

Three-Point Suspension

An unusual method of suspending the power plant, which is of the unit type with flywheel, clutch and gearset housing bolting to the rear of the crankcase through a flange, is employed. Three-point support is provided, but instead of having the single support at the front end with the two other arms at the rear as in the usual design, this scheme is reversed. Midway back on either side of the cylinder block there is an integrally cast arm which extends to the frame, while the third suspension point is further back, the rear of the gearbox being hung by a bracket from the center of a frame cross member. This method of suspension places the main supports where the greatest torque is, thereby tending to better crankshaft bearing alignment, since less twisting of their mountings is allowed, with consequent vibration reduction and lessening of wear.



Four-cylinder Lozier fitted with seven-passenger body in which the auxiliary seats fold into a recess in the back of the front seats when not in use. Running boards are clear and the tools are carried in a compartment on the engine base at the left. Chassis of Lozier four with 120-inch wheelbase and 36 by 4½-inch tire

Minus Intake Manifold

The simplicity of the power plant is accentuated in that there is no intake manifold on the right side, the carbureter attaching

direct to an opening in the center of the left side of the cylinder block, and connecting with the passages which extend between the cylinders within the casting to the inlet valve ports on the opposite side, the carbureter being on the left, but both sets of valves on the right. Carrying the entire intake manifold within the water jacket aids in carburetion by preventing condensation.

While simplicity is the last word in the intake manifold design, the exhaust manifold, a separate casting, has been made with a separate opening into each cylinder in order to eliminate back pressure.

On the right of the motor, which may properly be designated the equipment side, the water pump, tire inflation pump and magneto are grouped in a line from front to rear, being driven from one shaft with universal couplings between the adjacent units, and these units situated sufficiently low to leave the two valve cover plates well exposed and make the valve springs correspondingly accessible. The two units of the Gray & Davis starting and lighting system are grouped to the right of the gearbox.

Gray & Davis Installation

The Gray & Davis cranking and lighting system is standard equipment, electric motor and generator being separate. They are mounted on the right side of the gearbox, the motor being below the generator. The motor drives through a silent chain connecting with the clutch shaft, the reduction being 30 to 1. This is accomplished by a geared head on the end of the motor and there is a roller-clutch mechanism which disconnects the drive between the clutch shaft and the motor when the gasoline motor takes up its own operation. This electric device operates as soon as the starter pedal on the toe board is pressed and cranks the motor at from 75 to 100 r.p.m.

Another silent chain runs upward from the cranking motor sprocket to a sprocket mounted on the generator armature shaft. The roller clutch on the motor shaft prevents it from running when the engine is in operation, so that the generator drive is really through two sets of sprockets and chains, one running from the clutch shaft to the motor shaft and the other from the motor shaft to the generator shaft. These chains are completely housed, though accessible through a cover plate.

With this electrical equipment a 6-volt Willard storage battery of 80-ampere-hours capacity is provided, and it is hung from the frame in the space between the gearbox and the left side frame rail. It is reached through the front floorboard.

Silent Chain Camshaft Drive

The front end of the motor is especially silent, due to the method of driving camshaft and pump shaft. A single silent chain runs over the crankshaft, camshaft and pumpshaft sprockets. The whole is carefully housed.

The pressure system of lubrication is used. The flywheel, acting as a centrifugal pump, forces oil to the main bearings and to the front end drive. Troughs are arranged under each connecting rod and a dipper on the end of the rod plunging into the trough splashes oil to the bearings. Overflow runs to the reservoir below and after being strained is re-circulated. The oil filler and oil gauge are on the left side. The reservoir holds 3.5 gallons.

The cooling system includes a centrifugal pump, horizontal square-tube radiator, 18-inch belt-driven fan and plenty of water jacketing.

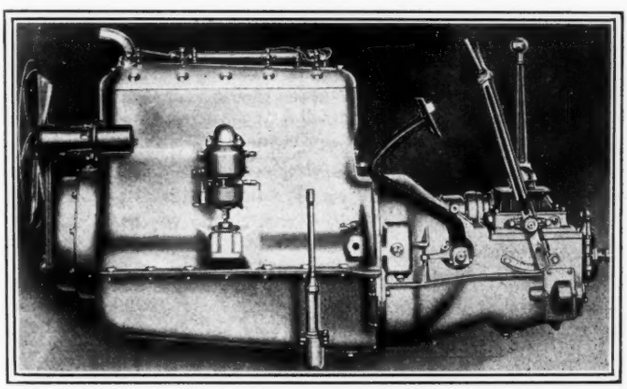
Ignition is furnished by a Bosch high-tension magneto.

The fuel supply system is of the pressure type with the gasoline tank of 20 gallons capacity suspended at the rear. This tank is cylindrical and the compressed air is obtained by the small plunger pump located in one of the valve lifters—a standard method of obtaining air pressure on Lozier cars.

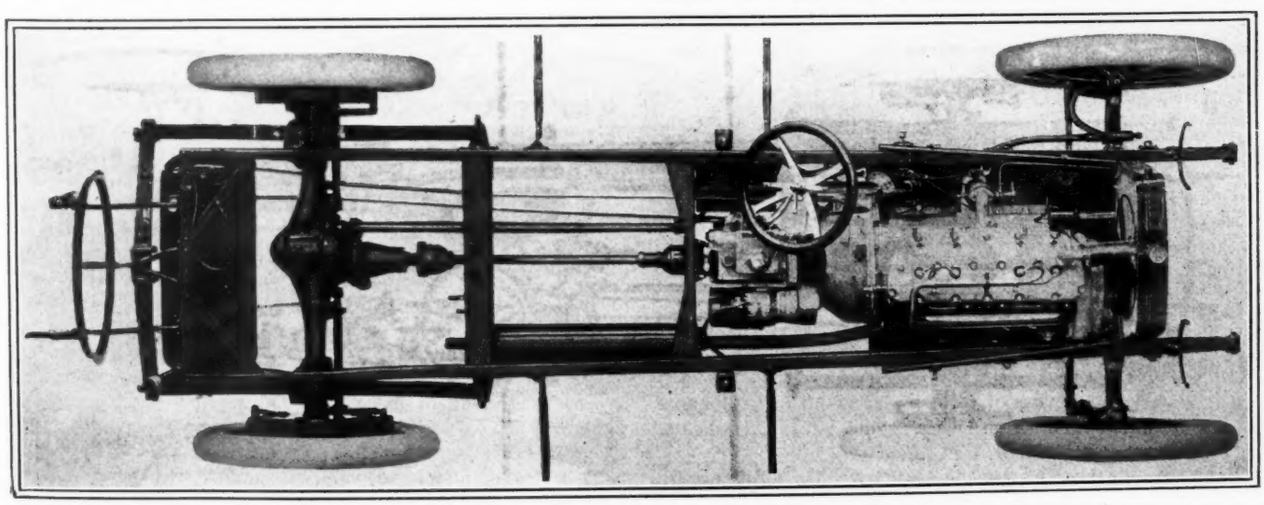
Tungsten Steel Valves Used

The valves are made of tungsten steel, said to be the best metal known for gas engine valves. The diameter of both inlet and exhaust is 2¼ inches with seats ground to an angle of 30 degrees, giving an area, valve open, of 1.816 square inches. The rocker form of valve lifter is used, giving very smooth action. The eight rockers are inserted in two brackets on the sides of the cylinders and are removable by taking off the side covers. The valve parts are all completely inclosed.

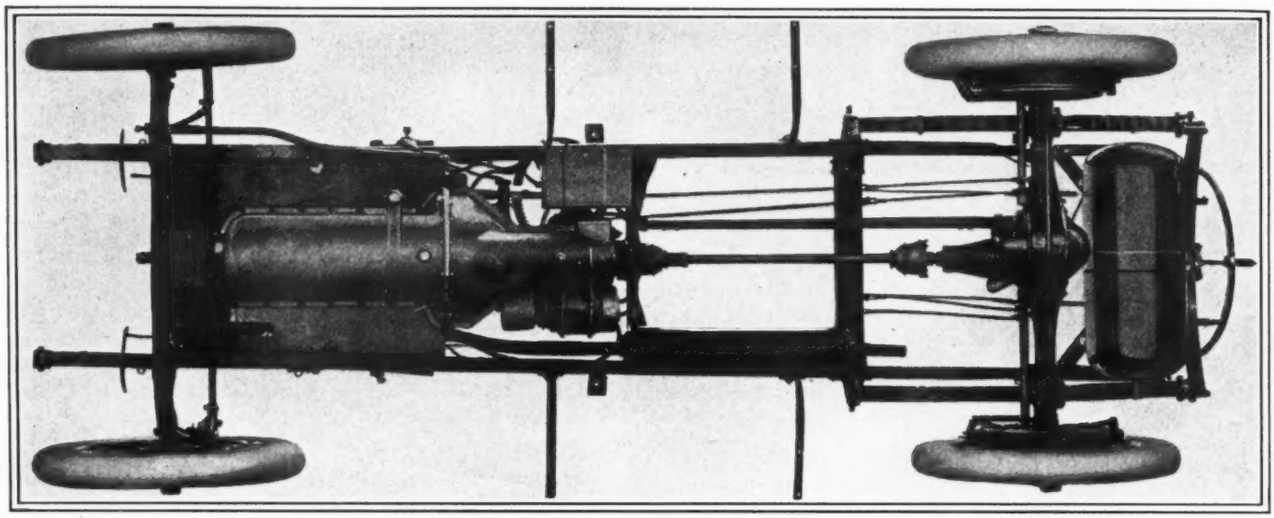
The moving parts are designed for best obtainable balance and lightest weight consistent with the required strength. The



Intake side Lozier four, showing carbureter bolting direct to block cylinder casting, the latter containing the upper half of the crankcase. The cylinder head is a separate casting carrying spark plugs, pressure relief pipe and wire conduit. Note central motor support



Chassis Lozier four, showing unit motor and gearbox supported at three points, one on each side opposite the center of the motor and the third in the form of a bracket from the center cross-member of the frame



Underneath view of Lozier four-cylinder chassis, showing how motor and gearbox are bolted together giving protection for chassis units without using the mud apron. The frame tapers from 30 inches width in front to 34½ in the rear

crankshaft is mounted on three bearings which are of the bronze shell back and white metal type. The camshaft is also mounted in three generous-sized bushings and can be easily removed through the front portion of the crankcase. The crankshaft bearing dimensions are of interest: Front, 2¼ diameter by 3⅜ inches; center, 2¼ diameter by 3 inches, and rear, 2¼ diameter by 4 inches. The lower connecting rod bearings are 2 by 3 inches.

The pistons, of gun iron, said to be strong and light, weigh 3.5 pounds each without rings or pins. The pins are of steel tubing, held in place by a set screw through one of the piston bosses. Each piston carries three concentric piston rings. The connecting-rods have phosphor bronze upper bearings.

The clutch of the multiple-disk type is housed in the flywheel and runs in oil. Alternate disks are faced with a special fabric of asbestos with metallic wires woven tightly together.

Uses Four-Speed Gearset

The gearset gives four forward speeds and reverse with the direct drive on the third speed, fourth being geared up somewhat. The gear shafts are mounted on ball and roller bearings and all parts are of generous proportions. The rear axle gear ratio is 3.9 to 1, while the reductions within the gearbox follow: First speed, 3.04 to 1 ratio; second speed, 1.72 to 1 ratio; third speed, 1.00 to 1 ratio; fourth speed, 0.78 to 1 ratio; reverse speed, 4.10 to 1 ratio.

The motor power goes to the rear through an uninclosed 1⅜-inch propeller shaft carrying a universal joint at each end, and paralleled by a torsion rod extending from the mid cross member back to the axle housing. The drive is taken through the side springs.

The floating rear axle is conventional with driving gears and differential fitted with adjustable thrust bearings and removable axle shafts.

The rear spring suspension is of the platform type with a rear cross spring attached to the frame at its center and shackled at its ends to the rear ends of half-elliptic side springs. The spring dimensions follow:

	Length	Width	Arch loaded
Fronts	38 inches	2 inches	2 inches
Rear sides	49 inches	2¼ inches	4 1/16 inches
Rear cross	38 inches	2¼ inches	4 1/16 inches

Tapered Frame Design

The frame used is tapered from a rear width of 34½ inches to a width at the front of 30 inches, giving a turning radius of 36½ feet.

Brakes act on the drums in the usual way through equalizers. The drums are 17 inches in diameter and their width is 2½ inches, which gives plenty of braking surface.

Left side steer and center control with brake and gearshift levers mounted on the gearcase are used.

The wheelbase is 120 inches and the wheels are fitted with 36 by 4.5-inch tires all around and on demountable rims.

The equipment is all of the most advanced order and serves to set off the streamline bodies with which the car is fitted. Special tonneau auxiliary seats in the seven-passenger body fold into a recess in the back of the front seat when not in use. A feature of the equipment, which will be appreciated by the motorist, is the single-cylinder air-cooled tire pump built into the motor. It is located on a bracket on the right side between water pump and magneto, the shaft connecting the two running through its base and carrying a small gear.

Besides the touring bodies with which this new chassis is to be fitted a very attractive roadster for two will be offered, built along the lines designed by Van Den Plas, the Parisian body builder.

Moon Adds Light Six for 1914

(*Continued from page* 1011.)

dial plate contains the lighting starting and ignition switches.

The model 4-42, which has been carried over from last year, is now fitted with the Delco system, the fan flywheel has been replaced by a fan in front of the motor driven by belt. A Stromberg carbureter fed by pressure is used. The essential motor dimensions remain the same, although the appearance has been altered, the T-head cylinders have a bore of 4.5 inches and a stroke of 5 inches with the exhaust valves on the right side and the intake valves on the left. Last year the valves were placed just the opposite. The water pump is now on the right side.

The drive is taken by a disk clutch and thence to a three-speed gearbox located amidship. Slight alterations have been made in the H-plate of the gearbox. As formerly, the driveshaft is furnished with two universals and transmits the power to a floating rear axle operating in the one-piece casing, which is a feature of Moon construction. The wheelbase has been shortened from 121 to 118 inches.

Other chassis changes are in the bearings. In 1913 imported ball bearings were used in the wheels, but now Timken rollers are used. Instead of using dash lights on the cars the headlights are equipped with two bulbs, one in focus and the other above it, providing a dimming arrangement. A choice of four body styles is offered, a two-passenger, four-passenger, five-passenger and a three-passenger coupé, the price being $1,750 for the first three, and $2,350 for the coupé.

New Six Leader in Austin Line

Two-Speed Rear Axle and Electric Cranking and Lighting

THE Austin Automobile Co., Grand Rapids, Mich., has brought out a new edition of its model 55 six-cylinder car, which, though the same in general appearance and in many of its chassis details as its predecessor, has a new motor, includes electric lighting and cranking as regular equipment and incorporates the Austin type of two-speed axle as a standard feature.

Walter S. Austin, head of the concern, has never gone in for quantity production, but rather prefers to make a relatively small number of vehicles of the high-powered variety, supervising personally the production of each vehicle. The Austin concern has maintained this same manufacturing policy for the 11 years in which it has been engaged in automobile making.

The new power plant of the Austin 55 is of compact design and clean appearance, the T-head cylinders being cast in blocks of three. The 4-inch bore and 5 1-2-inch stroke give a stroke-bore ratio of 1.375 and a piston displacement of 414.5 cubic inches.

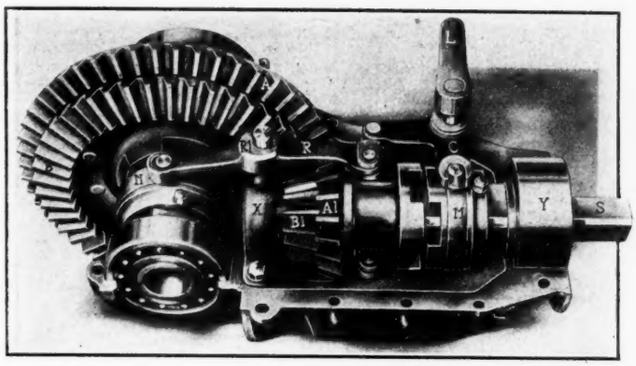


Fig. 1—View of two-speed rear axle assembly

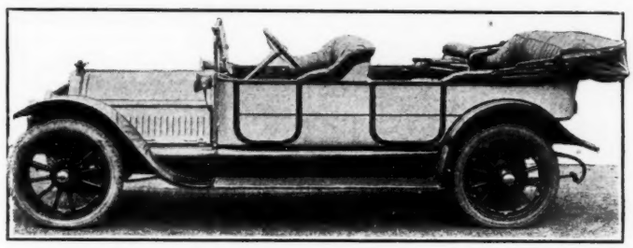


Fig. 2—Side view of Austin seven-passenger touring car

Engine Now T-Head

This engine replaces an L-head type of motor which had its cylinders in pairs, and though its bore was the same as now used, the stroke was .5-inch less, giving a ratio of 1.25 and a displacement of 376.9 cubic inches. Thus, though the S. A. E. rating would give these two motors the same horsepower, the new engine has somewhat of the advantage.

Due to the housing of the clutch, gearset and flywheel in unit with the motor, a three-point suspended whole is made possible, and to this end, the motor front is hung from the center of an arched frame crosspiece, and the two rear supports are provided by extensions of the flywheel housing.

The exhaust side is the right, while the left is given over to the intake. A short intake manifold construction is used in that the adjacent corners of the cylinder blocks have openings to the manifold. The gas is distributed to each of the cylinders within the cylinder castings from this point, the fuel being warmed by the jacket water which aids in vaporization and is an enemy of condensation.

The crankshaft and the camshafts are mounted on three main bearings each, which are all of the plain type and of generous proportions. The valves are 2 1-4 inches in diameter, this large size being easily obtained with the T-head construction. The timing gears housed at the front are helically cut. Easily removable aluminum valve mechanism covers make access to the valve parts an easy matter.

Lubrication is by a combination force-feed and splash system. Cooling is direct water circulation assisted by a centrifugal pump and vertical-tube radiator. The Bosch magneto on the left fires the six plugs independently of the lighting and cranking apparatus.

Remy Electric Equipment

A Remy two-unit cranking and lighting system is used with separate motor and generator on the right of the power plant, the generator forward and driving at 1.5 engine speed through gear connection with the timing gears and the cranking motor back of it connecting through gears to the flywheel ring gear with a reduction of 17 to 1. A roller clutch breaks the connection when the engine starts. This apparatus is of the 6-volt type

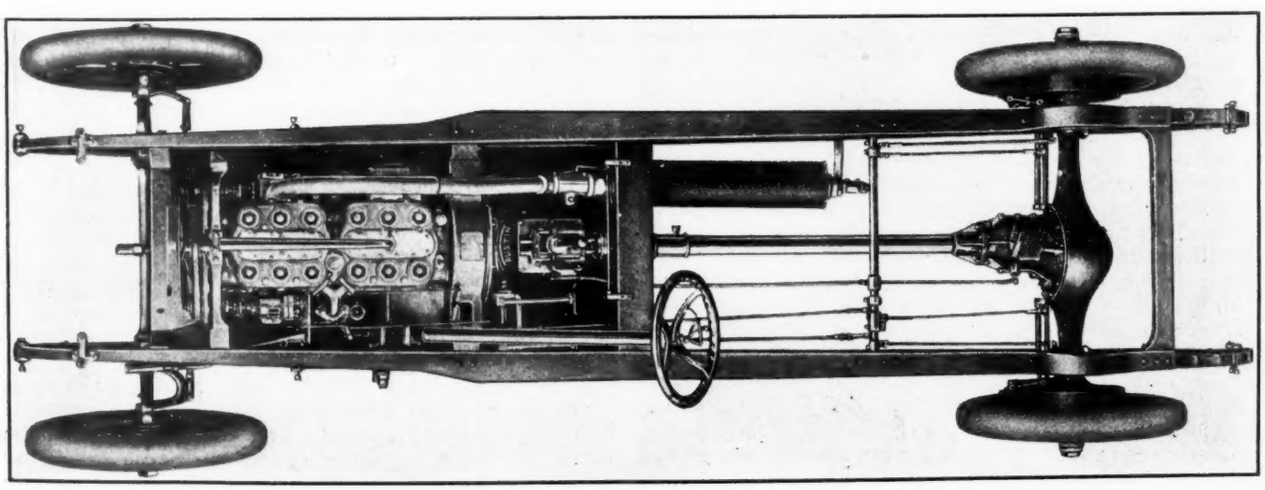


Fig. 3—Plan view of chassis, showing mounting of power plant and arrangement of the drive members

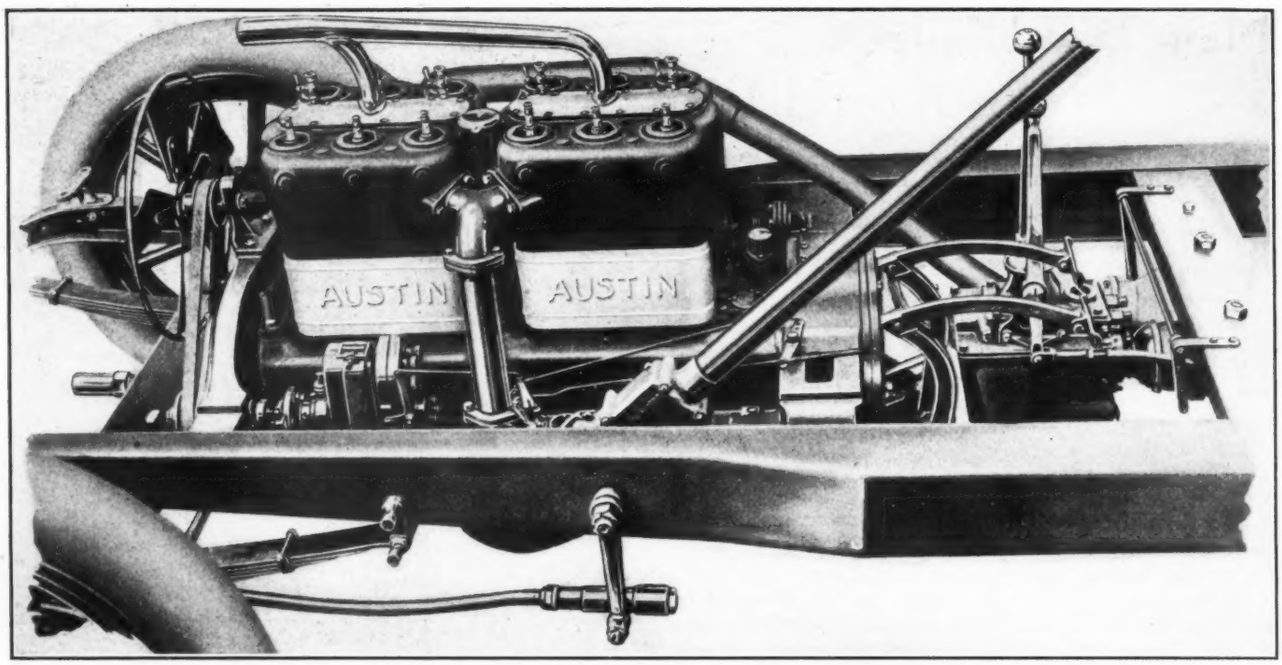


Fig. 4—Power plant used in 1914 Austin car. Note left steering and center control

and with it is used a Willard 120 ampere-hour storage battery which is hung inside the frame and reached by removing the tonneau floorboard. This electrical system replaces an air starting system.

The generator begins to charge the battery at an engine speed of about 200 revolutions a minute, and its full output is available at a car speed of about 15 miles an hour. Due to its design and connection to the power plant, the electric motor rotates the crankshaft at about 125 revolutions per minute. It is only necessary to press the starter pedal after the ignition current is switched on in order to crank the engine. A reverse-current cutout prevents battery discharge back through generator, and provision is made for the automatic sending of storage battery energy direct to the lights when the generator is not operating at night.

Left drive and center control are featured and, although the steering wheel and spark and throttle levers are conventional, the brake control is not. The service brake is connected with the clutch pedal, coming into play after the clutch has been completely disengaged. The other pedal operates the emergency brakes, and is provided with a ratchet for holding them in set position. These brakes work on the usual type of rear wheel drums 16 by 3 inches. Taking the place of the ordinarily fitted emergency brake lever alongside of the gearshift lever, is the lever which shifts forward or back to operate the two-speed axle.

Two-Speed Rear Axle

The Austin two-speed axle, which was the first to be used commercially in a motor vehicle, affords two separate gear ratios on direct drive. The regular ratio is 4 to 1, while the special direct gives 2.5 to 1. Shifting from one to the other may be done at will without interfering in any way with the gearing in the gearbox. Thus six forward and two reverse speeds are afforded with this axle construction in combination with the three-speed gearset. The special advantage of this double axle ratio is that for hills, bad roads and crowded city traffic the car may be made especially flexible of control by the use of the 4 to 1 ratio without the bother of continual gearshifting, while for normal driving it is instantly possible to gear it up to 2.5 to 1, which means a material slowing down of the engine for a given speed of the vehicle. This in turn makes for less vibration, increases the mileage per gallon of fuel and reduces noise to the minimum.

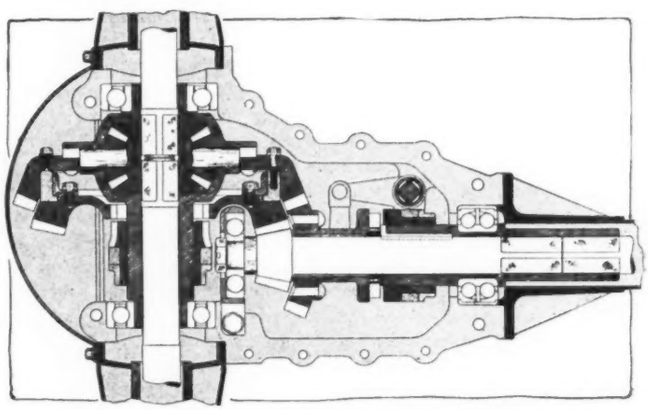


Fig. 5—Detail view of Austin two-speed rear axle

Combining a six-cylinder motor with a two-speed axle, the Austin car is obviously fitted for the greatest possible range of flexibility.

Referring to the illustration just above, on this page, which shows the Austin axle in section, and also to Fig. 1, that at the top of page 1015, there are two driving pinions and two bevel gears, the rating gears of each set being always in mesh. The gear A and its pinion give the high ratio, while gear B affords the low ratio. This outer gear A is solid on the differential, while B runs free of it except when clutched. Pinion A_1 is also free of the drive shaft S when clutch M is in the position shown.

Details of Operation

With both axle gear combinations in neutral position as in the illustration, suppose it is desired to shift into the 4-to-1 ratio. The shift lever in the forward compartment of the car is thrown forward. Through rod connection, this operation pushes lever L backward. Lever L is connected with the pivoted bell crank C, and this movement throws the arm of C which is connected to clutch M forward (sliding M out of connection with the mating teeth which are rigidly connected to pinion A_1) and at the same time moves the forward end of rod R to the right. This rod being pivoted at R_1, its rear end moves in the opposite

direction and slides clutch N into engagement with its mating portion which is rigidly connected to the inner gear B. Now the drive is direct through the shaft S to pinion B_1, through gear B to clutch N. Clutch N slides on the squared sleeve which is an integral part of the differential and thus the power goes through the latter to the axle shafts in the usual way. Gears A and A_1 are running idle now and slower than the shaft S.

But when the shifting lever is pulled back, lever L goes forward and the clutches move in the reverse direction from that seen above. Through their interconnection, N disengages and M comes into engagement with the pinion A_1. Clutch M on the squared portion of shaft S now transmits the power through the pinion A_1 to gear A which is permanently connected with the differential. The high or special direct drive is now operating and the gears B and B_1 run free.

Looking at the design, several features stand out prominently. The whole unit is exceedingly compact, while its design makes possible an exceedingly sturdy construction. The placing of one clutch on a pinion and the other on a gear makes it possible to have a very strong drive shaft S, the generous proportions of which are evident from the illustration. The construction also gives room for a very large ball bearing X, at the end of the driveshaft. This is a No. 56 and has nine 3-4-inch balls. This bearing does not take any end thrust, that being carried by the double-row, ball thrust bearing Y which is back of the clutch M. Thus the shaft is rigidly mounted and proper alignment is assured. With either gear combination in operation the drive is well cared for. Although the outer gear is solid to the differential, the inner is just as well provided for when its clutch is engaged.

Rear-Axle Flexible

The representative of THE AUTOMOBILE was given a demonstration of the new 55 equipped with this two-speed axle and can frankly say that its flexibility is unsurpassed. For three-quarters of the trial run the top gear ratio was used exclusively. There is nothing to be gained with a two-speed axle if the driver must continually shift from one gear ratio to the other. He might just as well shift gears in his gearbox, for the operation is about the same. The Austin 55 performed well up and down the hills of Grand Rapids without effort and with no shifting of the gears in the gearbox. Only a few shifts to the low axle ratio were made, most of them when the car had to climb hills and one when a full stop was necessitated. Starting again, the car moved away without effort and when up to speed, the high ratio was again used. Not once was an indirect drive through the gearset necessary, even in starting from the full stop.

The easy riding should not be overlooked in speaking of this run. Equipped with three-quarter elliptic rears and half elliptic fronts of 61 and 40 inches length respectively, the car is well suspended. These springs are controlled by shock-absorbing devices of an entirely new design which are patented. Of an hydraulic type, they effectively cushion all road shocks, much to the comfort of the passengers. The rear springs are underslung, giving them a large range of action.

Well Designed Torque Tube

Further inspection of the chassis shows a well-designed torsion tube inclosing the propeller shaft and terminating at the floating rear axle housing. At its forward end the propeller shaft is fitted with a double universal joint which takes care of any possible misalignment, the front portion taking any slight up and down spring movement. The frame is very strong and well braced. Four cross members back of the power plant are used, while the side frame rails are 6 inches deep and 4 3-4 inches wide at the dash.

The wheelbase remains unchanged at 141.25 inches, this giving plenty of room for a very spacious rear compartment. Auxiliary tonneau seats of the disappearing type are also fitted in the seven-passenger and since the rear seat is wide enough to accommodate four, the car with these extra tonneau seats is really capable of carrying eight without crowding.

The equipment is inclusive of everything necessary for immediate road work and leaves nothing to be desired. Tires are 37 by 5 inches all around and mounted on demountable rims.

Besides this model 55, the Austin company makes two other models which are built with substantially the same chassis and bodies, though the motors are of higher power. Model 66 has a 4.5 by 5.5-inch engine, while model 77 is equipped with a 4.5 by 7 power plant. These are both sixes and are much alike in general design, though differing from the motor described. Their cylinders are separately cast, have T-heads, have exposed flywheels, back of which are the gearsets, and give approximately the horsepower which their model designations indicate.

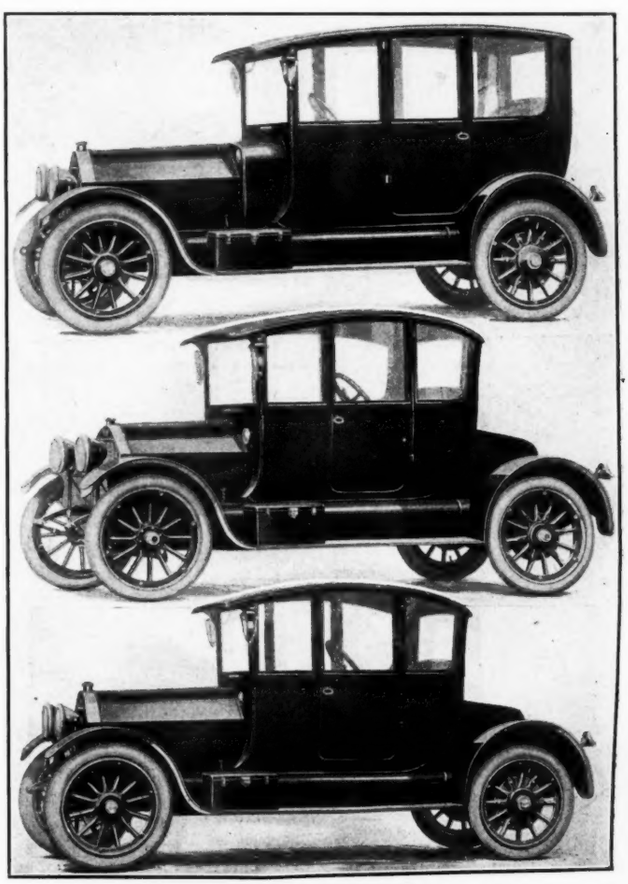
—

Marion Has Three Closed Models

INDIANAPOLIS, IND., Nov. 17—The Marion Motor Car Co., Indianapolis, Ind., has departed from its policy of producing open cars exclusively by announcing three closed models for the coming season, a four-passenger coupé for both the four and six-cylinder chassis and a sedan for the six-cylinder chassis alone.

On all three models the lines are simple but harmonious and show that the body designs were well thought out and were planned to suit the characteristics of the Marion chassis. Large window spaces give an almost unbroken view in every direction and in rainy weather clear vision is secured by the roof, which keeps the glass front from being blurred by raindrops to a certain extent. In addition to the side lights, which are flush with the dash, two six-sided, pear-shaped pillar lamps are suspended from the top front corners of the bodies on all models. With the exception of a tool box, the running boards are clean.

Blue broadcloth upholstery, an electric dome light, instrument board and left drive are the main points of similarity between the coupé and the sedan.



Three new Marion body types now on market

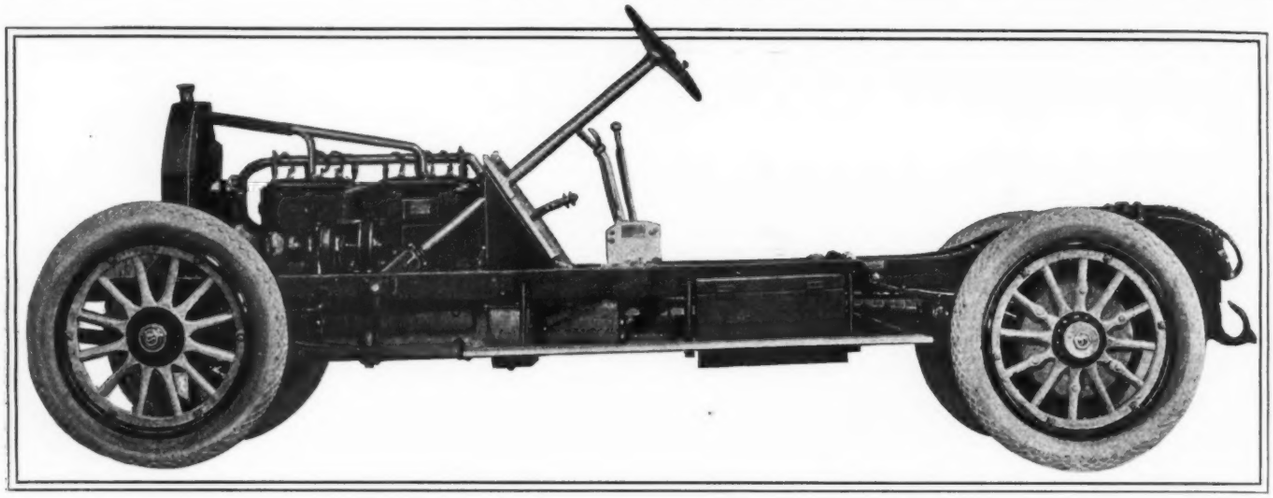


Fig. 1—Side view of Speedwell six chassis known as series 8 for this season

Speedwell Six Continued

Motor Remains the Same and But Few Chassis Changes

More Complete Equipment at Same Price

SPEEDWELL cars are now marketed in series rather than in yearly models. The six-cylinder car manufactured last year under the name of the series G is continued this year with minor refinements as series H, one chassis being fitted with a full line of body styles. No changes have been made in motor dimensions in any way, the power plant used on the 1913 product being continued without change. In fact, all the changes which have been made are minor chassis refinements and alterations of body design to bring the car thoroughly up-to-date in appearance as well as in mechanical construction. The rear axle has had a slight alteration in that the torsion tube springs were not inclosed on the series G, while now a housing has been fitted and the end of the torsion rod which was flat at the point where it passes between the springs, is now fitted with a ball. A safety strap has also been fitted to prevent the torsion rod from falling to the ground in case the front end should become loose. The frame design, frame materials, wheelbase, brakes, etc., are all the same as during the past year.

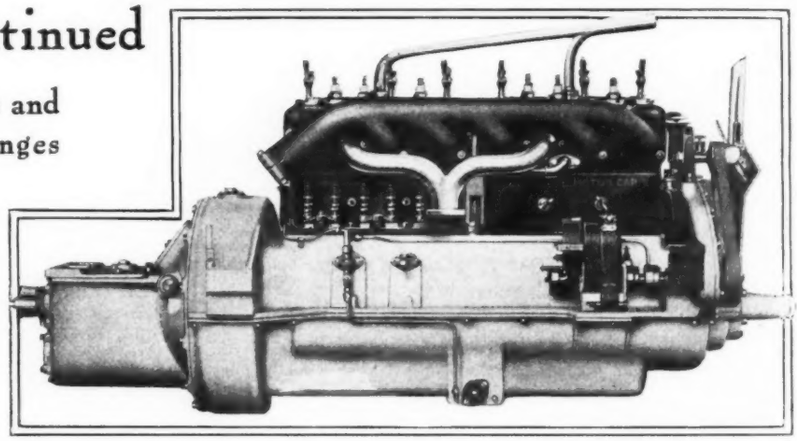


Fig. 2—Manifold side of Speedwell six motor, showing valve covering

Many Equipment Features Added

From the dollars-and-cents standpoint the Speedwell car for 1914 is a better value than ever before. The price has not been changed from last year, but to the equipment has been added a two-cylinder power tire pump, battery indicator, Warner speedometer, oil feed indicator, quick detachable storm curtains, trouble lamp with socket on dash, gearshift lever lock and a better electric horn. These were not fitted last year, but are now included at $2,850 for the five-passenger touring and $2,950 for the seven-passenger touring.

In changing the body design a wider rear seat has been furnished and the partition in the front seat has been omitted, permitting of the use of a single cushion. The upholstering has also been improved to give more luxurious riding qualities.

The Speedwell power plant is a single unit embracing the motor, clutch and gearset. This whole unit is suspended at three points, two of which are at the rear of the motor and the third a pivot support on a rocker arm at the forward end of the motor. The motor is what is classed in America as the long stroke type, having a bore of 4.125 inches and a stroke of 5.25 inches. It is rated at 60 horsepower at approximately 1,500 revolutions per minute. The cylinders are cast in two blocks of three from a special grade of gray iron produced in a reverberatory air furnace. The cylinder base flange is extended to carry the guides for the valve lifters, thus forming a shelf which is an easy foundation for the cover plates housing the push rods, etc. The waterjackets are cast integrally with each cylinder block, but the cylinder waterjacket head is cast separately and is removable.

Long pistons are used, each having three diagonal split eccentric expansion rings. The piston pins are of nickel chrome steel fitted with phosphor bronze bushings and the connecting-rods are I-beam of .35 to .45 carbon steel drop-forged and heat-treated.

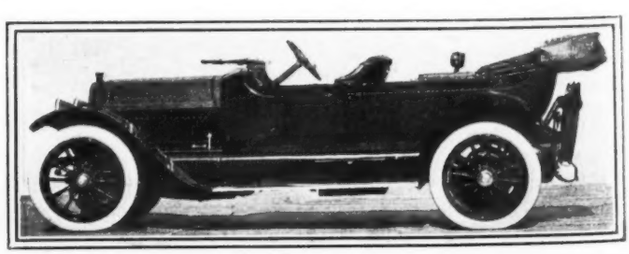


Fig. 3—Side view of seven-passenger touring car

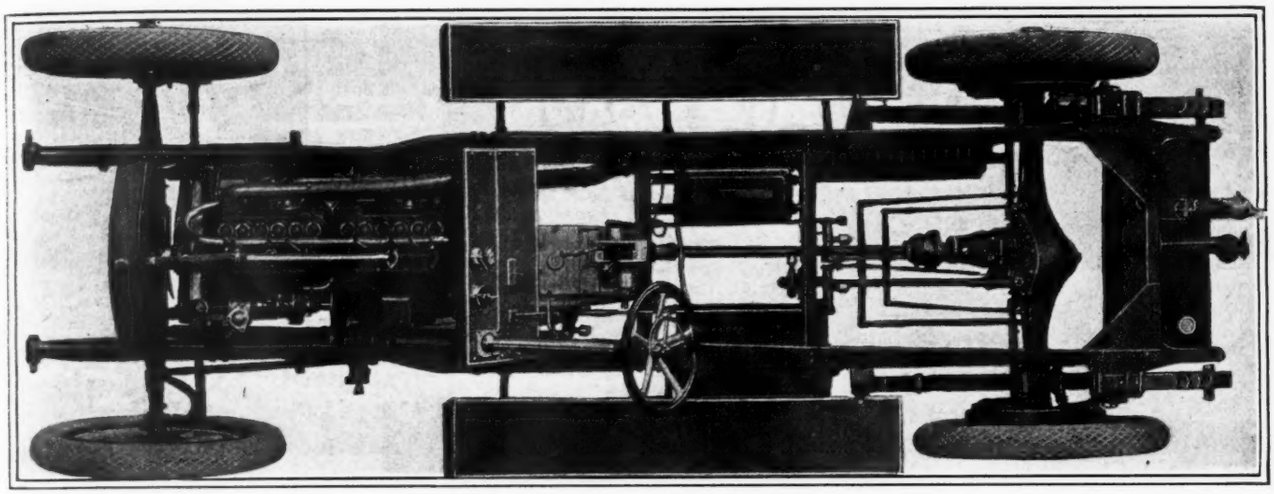


Fig. 4—Plan view of Speedwell six chassis, showing arrangement of drive members and left steering

The camshaft is drop-forged from a single piece of low carbon steel and carries the cams integral. The camshaft bearings are carried on long nickel Babbitt bearings and run in oil. The timing gears have a helical pitch.

The electric equipment of the car includes a Wagner electric starting and lighting system and a Bosch Dual ignition system. The battery used in connection with the electric system is a Willard of six cells, delivering 12 volts on the discharge, but charging at 6 volts. The current characteristics of the Wagner generator are such that it charges at its maximum rate when the car speed is 15 to 18 miles an hour. The clutch is a multiple dry disk type, having thirteen plates alternately faced with steel and Raybestos. The plates are held in contact by three clutch springs. The driveshaft is fitted with a Spicer universal joint having a metal case at each end. The drive is taken by bevel gear to a floating Timken rear axle carried on roller bearings. The front axle is also Timken, with nickel-steel steering knuckles, giving a heavy construction at this point.

Special Construction a Feature

A commendable feature of the car is the heavy work around the fenders. The construction here is exceptionally substantial, the attachment of the fenders to the running board being by brackets, which, while rigid, permit of easy removal of the fenders. Nothing is carried on the running boards, all battery and tool compartments being concealed. The tool box, furnished with a lock, is built into the mud apron, which extends from the running board to the under-side of the body.

Frame construction is heavy, the side channels being 4.56 inches in depth and having a 4-inch flange width. It is inswept at the front and lifts at the rear, providing a support for the 28.5-gallon pressure gasoline tank. The wheelbase is 125 inches and the tires are 36 by 4.5 inches on the five-passenger models and 37 by 5 inches on the seven-passenger model. Firestone demountable rims are fitted all around and the tire carriers, which carry either one or two tires on demountable rims, are rigidly mounted at the rear of the car.

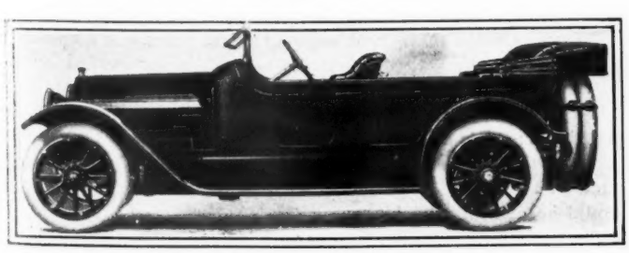


Fig. 6—Side view of Speedwell five-passenger touring car

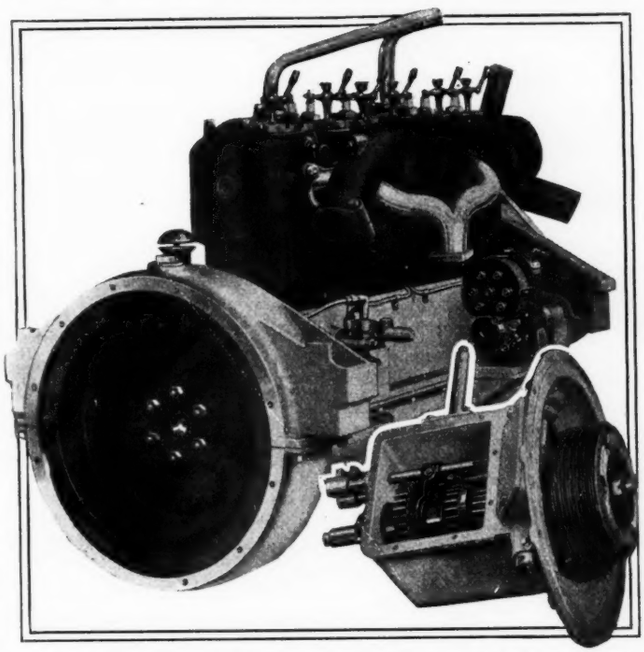


Fig. 5—Three-quarter view of motor and gearset housing. Note unit construction, clutch cover, bolting against face of flywheel cover. The crankcase casting is continued back as far as the flywheel housing, the portion bolting against this casting being continued back to inclose the clutch and the gearset

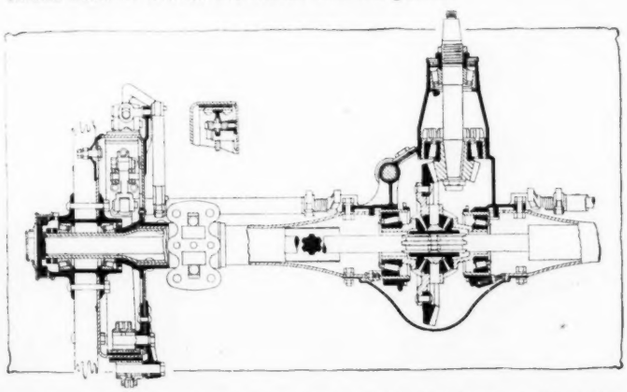


Fig. 7—Sectional view of rear axle which has been modified this season by putting a ball at the end of the torsion rod at the point where it passes between the springs and by fitting a cover over the torsion tube springs

The Rostrum

Accessibility Does Not Seem to Be Improving

EDITOR THE AUTOMOBILE:—It seems strange to me that the matter of accessibility has not kept pace with the improvement and other features of design of the 1914 car. While in a few cases a maker may be able to say that his 1914 chassis is a more accessible proposition than the 1913, this is not, in the main, true.

If one takes the various points at which adjustments must not infrequently be made, it will soon become obvious that these are not always easy to reach. One of the things that needs adjustment more than any other on a car is the brakes. Many makers have rendered their brake adjustments accessible by placing them in such a position that they can be reached by lifting the front floorboards. Others have them outside of the frame, but a good many more are so placed that it is necessary to reach beneath the body either at the rear in close proximity to the brakes themselves, a position that is rendered inaccessible by the wheel, or beneath the chassis near the point where the connection is made to the brake pedal or lever. Where the floorboard is removable it often requires about as much effort and loss of temper to remove it as it does to fit a stubborn collar while your wife is waiting to sally forth to the opera.

The brake adjustments are by no means the only ones neglected: in fact, one cannot mention a single part of the car that requires attention which is not, in many makes, exceedingly difficult to reach. Let us take the engine bearings: If a nut should become loose on the bearing cap at the bottom of the connecting-rod, in how many makes can this be reached without taking down the whole engine? Very few indeed are supplied with cover plates on the side of the crankcase.

Many of the cover plates that are put over the gearbox cover holes so small that the hand of an infant would have difficulty in reaching around to locate the source of a knock. To make minor replacements in many of these gearsets it is necessary to lift this entire unit from the chassis, and very often that requires taking down a number of other parts. The same may be said of the differential: If it is desired to mesh the pinion closer with the bevel gear only one who has had some experience with this kind of work can tell the amount of labor and time required where special provision for making this adjustment is not made.

These examples are selected at random and are merely intended to show that the automobile, although it is progressing by leaps and bounds in ease and economy while the passengers and driver are in their seats, is not going ahead very rapidly in the features necessary when it has to be pulled up alongside of the road or in the garage.

New York City. J. E. S.

Questions Covering the Automobile Field

Editor THE AUTOMOBILE:—1—I would like to know just how the worm drive type rear axle overcomes the action when the wheels rotate at greater speed than the motor is being driven, as when a car is descending a hill with the clutch engaged and the high gear in mesh.

2—What is gained or lost by having cylinders rebored and large size piston fitted, and what is the amount of horsepower gained in proportion to the amount bored in a four-cylinder motor having a 3¼-inch bore and a 3¾-inch stroke?

3—Would it be possible for me to get plans for a cyclecar from some maker?

4—Would you attribute the Alco company's failure in the automobile line to their making too good a car for the money, just as the De Luxe company did a few years ago?

5—I would like very much to get particulars relating to Harry Endicott's death.

6—Are the majority of racing drivers A-1 mechanics?

7—Who is considered the best driver in this or any other country?

8—What is the fastest speed attained in an automobile? Who made it? In what car? When was it made and where?

9—Has any other moving object, carrying a man, made faster speed?

10—Could you tell me what has become of Louis Chevrolet?

11—What are the details regarding the demise of Louis Strang?

12—What were the contests held at Guttenberg, N. J., and were they sanctioned by the A. A. A.? Were all there official drivers?

13—What progress is being made with the track on the Newark Meadows?

New York City. J. B. HURD.

—1—When the motor is being driven by the car and a worm drive rear axle is used the gear naturally must drive the worm and, as you suggest, considerable pressure exists between the gear tooth and worm. This pressure exists also between the teeth of the bevel gears on a bevel gear drive, but not to such an extent as the components are more of a frictional nature in the case of the worm drive. The entire situation, however, does not seem to be grave, because worms have stood up for a number of years without any serious amount of wear under these circumstances. The biggest essential in a worm drive is to keep the lubricant between the worm and the gear, and when this is done and the materials are of the best no serious harm seems to result through the reverse drive. Of course, much depends on the pitch of the worm, and where this is steep the reverse pressure would be considerably higher.

2—A rebored cylinder is a very variable proposition in that the cut taken on the boring machine may vary from .001 to .002 u

to a formidable amount of metal. This, of course, increases the piston displacement by the volume of metal which is taken off and correspondingly increases the compression. How much actual horsepower will be gained in any definite case is merely a matter of conjecture and would probably bear no definite relation to the amount of metal cut from the cylinder.

3—Plans of the different makes of cyclecars have appeared in these columns from time to time and others will be published in the near future. Any maker would be glad to supply specifications of his own make, but probably would not supply complete working plans as these are only for the use of those who build that particular make of car.

4—The reasons for the abandonment of the automobile field by the American Locomotive Co. were clearly set forth in an editorial entitled, "The Reason Why," in THE AUTOMOBILE for August 28, 1913. To quote from this editorial it was stated that "The American Locomotive Co. has abandoned the automobile field and by this act has acknowledged its incapacity to cope with problems met and answered by scores of manufacturers who have succeeded by clear calculation of the conditions governing the case. It is another case * * * of assumption that a general knowledge of manufacturing conditions furnishes elements of success in a highly specialized field forgetting that this is an age of specialists and that the automobile in the form of its present fool-proof simplicity is the most highly specialized product of modern engineering. * * * To finally attempt the survival of the business by serious price cutting was the final folly, only to be answered by a complete acknowledgment of incapacity by the total abandonment of the enterprise."

5—Harry Endicott was killed while driving a Cutting car in practice at Jackson, Mich. This practice was for the races to be held during September on the Jackson track and the date of Endicott's death was September 5, 1913.

6—The majority of racing drivers are excellent mechanics. This is true, almost without exception.

7—There is such a wide difference on this point that it is impossible to give any answer. By studying the results of the recent big events you will no doubt form your own opinion.

8—The fastest time ever recorded for an automobile was made by Bob Burman in a 200-horsepower Blitzen-Benz at Daytona Beach, Fla., April 23, 1911. On this occasion he made a mile in 25 2/5 seconds with a flying start. This is at the rate of 141 miles an hour.

9—No other moving object carrying a man has ever been recorded to have made a faster speed.

10—Louis Chevrolet is actively engaged in the manufacture of the cars bearing his name.

11—Louis Strang was killed while driving the technical committee car in the Wisconsin State Tour, July 20, 1911. It is stated that he was attempting to pass another car on a road built up on a high embankment and after he had passed around to the outside of the car which he was attempting to pass the weight of his car caused the embankment to give away permitting the car to roll down the hill and killing the driver. Louis Strang was noted for the fact that he had never had any accidents during his racing career, but met his ill fortune at a time when there appeared to be no risk whatever.

12—The contests held at the Guttenberg, N. J., track were dirt track races. They were all held in 1911 and all were sanctioned, the drivers being registered with the Contest Board of the A. A. A. In all there were four races.

13—The track on the Newark Meadows has been abandoned, the reason being that it cost too much to fill in the swampy ground that had first been selected as the site and because no other practical site was found to be available.

Black Fiber Stick To Measure Fuel

Editor THE AUTOMOBILE:—The article on Calculations for a Cylindrical Tank by Milton Sayles in THE AUTOMOBILE of October 23 leads me to suggest the use of a piece of round black fiber for the tank stick. I have used this with great satisfaction as the gasoline depth shows clearly, always, while the black soon comes off from the various rules in common use for this purpose.

St. Louis, Mo. H. S. WELLS.

Suggests Ball Bearing Crankshaft

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for October 30 there appears on page 828 an article regarding the use of ball bearings in crankshafts. To speak more correctly, the article appears on page 829 and the illustration on page 828. Herewith is shown, Fig. 1, the most approved method of applying ball bearings to crankshafts. Most engineers in this country have failed in the use of ball bearings in this particular place through the improper adaptation of same, whereas many of the Europeans have obtained the greatest success. The lack of success

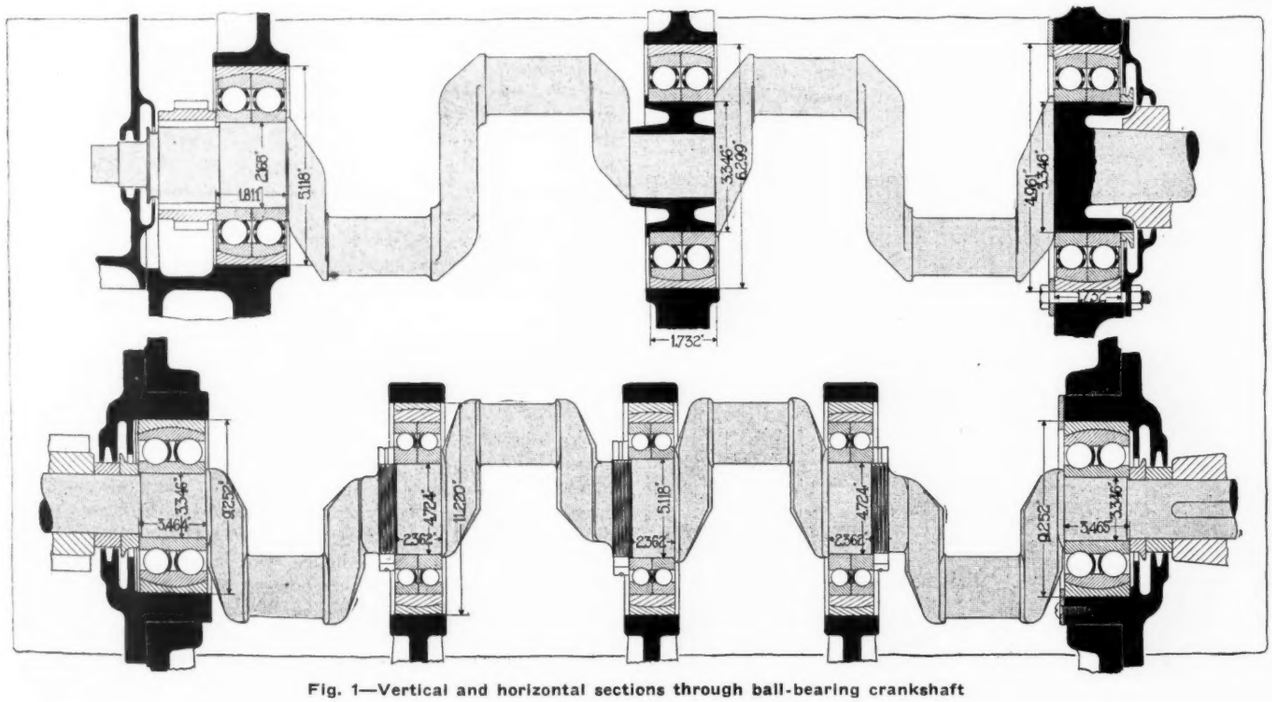


Fig. 1—Vertical and horizontal sections through ball-bearing crankshaft

here has been due almost entirely to the fact that no provision was made for the springing of the crankshaft or other disalignment.

You will note that the illustrations are entirely novel to American practice.

New York City. RHINELAND MACHINE WORKS CO.

Wants Best Anti-Freeze Solution

Editor THE AUTOMOBILE:—Will you kindly let me know what preparation I could use in my radiator this winter, that would not freeze and not injure the engine or radiator?

Lee, Ill. EARL WRIGLEY.

—There are three anti-freezing solutions that have been used extensively and which have proved satisfactory. They are alcohol, glycerine and calcium chloride. There are many others that have a low enough freezing point but are objectionable because they evaporate quickly, do not carry the heat away fast enough, corrode the parts of the cooling system, leave a deposit in the radiator, do not flow freely or are too expensive.

A solution of alcohol in water most nearly fills the requirements of a perfect anti-freezing mixture. Either wood or denatured alcohol may be used and can be purchased at any drug store for about 60 cents a gallon. The advantages of alcohol are that it is very easily handled and has no corrosive action on the metal parts of the cooling system. Wood alcohol has a lower freezing point than the denatured product so a weaker solution is needed for any given condition, but this advantage is more than offset, in most cases, because with the former more is lost by evaporation, due to its lower boiling point. This necessitates adding wood alcohol more often than is the case when denatured is used, in order to keep the solution up to normal strength.

The percentage of alcohol, by volume, to give a certain freezing point can be obtained from the curve Fig. 2, or from the table below:

Freezing Point, Degrees Fahrenheit	DENATURED Alcohol, Per Cent.	DENATURED Water, Per Cent.	WOOD Alcohol, Per Cent.	WOOD Water, Per Cent.
10	28	72	17	83
0	40	60	24	76
10	52	48	31	69
20	63	37	38	62

So little water is lost by evaporation that it is only necessary to add alcohol to the system, from time to time, to replace that which is used up.

Glycerine and water have also been used extensively for the reason that the boiling point of glycerine is about the same as that of water, so very little is lost by evaporation. The use of glycerine is found objectionable, however, because when enough is added to produce a low freezing point it rots the rubber hose connections and is so gelatinous that it does not circulate readily, especially is this true when it is used in a thermo-syphon system. The proportions of glycerine and water to use are indicated by the curve Fig. 2 or may be obtained from the table:

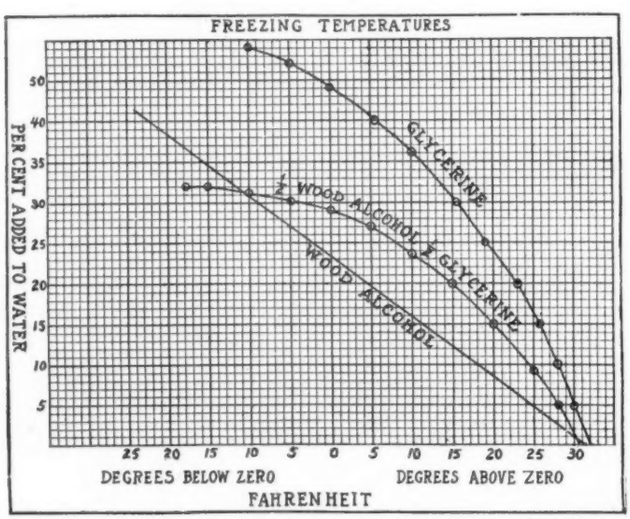


Fig. 2—Freezing points of glycerine and glycerine-and-alcohol solutions

Freezing Point	Glycerine	Water
+28 degrees Fahrenheit	10 per cent.	90 per cent.
+15 degrees Fahrenheit	30 per cent.	70 per cent.
+ 5 degrees Fahrenheit	40 per cent.	60 per cent.
0 degrees Fahrenheit	48 per cent.	52 per cent.
— 5 degrees Fahrenheit	54 per cent.	46 per cent.
—10 degrees Fahrenheit	58 per cent.	42 per cent.

The difficulties in the way of using glycerine and water alone have led to the use of a mixture containing alcohol in addition. In this way a solution is obtained that has, in a large measure the good points of both alcohol and glycerine. The presence of the glycerine raises the boiling point, thereby reducing evaporation, yet the glycerine is sufficiently diluted to allow a free flow and to reduce its action on the hose connections to a negligible amount. The alcohol and glycerine are generally added in equal parts to the water, the amount depending upon the freezing point desired. Fig. 2 shows the percentage of mixture to add or this may be obtained from the accompanying table:

Freezing Point	Mixture	Water
+20 degrees Fahrenheit	15 per cent.	85 per cent.
+15 degrees Fahrenheit	20 per cent.	80 per cent.
+10 degrees Fahrenheit	24 per cent.	76 per cent.
+ 5 degrees Fahrenheit	27 per cent.	73 per cent.
0 degrees Fahrenheit	29 per cent.	71 per cent.
— 5 degrees Fahrenheit	30 per cent.	70 per cent.
—15 degrees Fahrenheit	32 per cent.	68 per cent.

Calcium chloride in water is another solution that has been used with success. When purchasing calcium chloride it is very important to ask for the chemically pure salt as the commercial variety contains free acid which reacts on the metal parts of the cooling system. If it is impossible to obtain the former, the latter may be made fit for use by neutralizing the acid. To do this, add ammonia or soda ash gradually to the calcium chloride solution until blue litmus paper no longer turns pink when moistened with the solution. The amount of calcium chloride to use may be found from the curve, Fig. 3, or from the table:

Pounds of Calcium Chloride per Gallon	Freezing Point, Degrees Fahrenheit
2	18.0 above zero
3	1.5 above zero
4	17.0 below zero
5	39.0 below zero

Many other anti-freezing liquids have been experimented with but have been found to be inferior to those described. Various oils, including lubricating oil and kerosene, have been tried but these cause decay of the rubber hose connections, lack sufficient heat capacity, and in many cases evaporate too rapidly. There are any number of salts beside calcium chloride that will give a low enough freezing point but are not suited for use because of their high cost or action on the metallic parts of the cooling system. It is for the latter reason that common table salt and sal-ammoniac are not employed.

A New Type of Streamline Limousine

Editor THE AUTOMOBILE:—The following article is more of a comment, putting forth reasons why the car here illustrated, Fig. 4, is superior to the present limousine, than a criticism of the present type of closed car.

Since the introduction of the limousine there have been offered by our manufacturers some beautiful closed cars, each at the time of their presentation representing almost the last word in motor car coach building. The general outward appearances of these cars have been almost identical in symmetry, flat tops and straight sides with cab doors. For several years the manufacturers stood still, as it were, being unable to break away from this conventional type. Foredoors and inclosed driver's compartments were added, all in an effort to get away from the monotony of this design in an attempt to offer something new. Finally a year or two ago the arched door arrived, helping a little to vary the sharp, bold ungraceful lines of these cheesebox cars. At the same time came the sashless windows and other little refinements so distinct from the ordinary carriage.

There can be no denial that the cars offered with these improvements are beautiful in spite of the top-heavy appearances noticeable in so many of them. At last there appears this year the final parting from the stiff, straight lines of the old-fashioned horse-drawn carriage. Manufacturers have started well on the way of producing a strictly automobile type of limousine, a type that makes a graceful unit with the rest of the car, and enables the body designer to introduce new distinctive lines which heretofore were impossible to express.

An Exclusively New Design

Oval fenders, dome-shaped streamline body with a rising straight-line motor bonnet and doors opening flat against the car are the new features of this beautiful type of body. While this type is faultless, I think that the illustration shown here has even exceeded these cars in beauty of design and is in a class by itself. This car is exclusively a new type, so far as I know. Some may call this car radical but I hold that it is not. It is an observation limousine and when the roads of this country have reached the stage where touring long distances will be a pleasure to be anticipated the value of this style will be then appreciated. The entrance to this car is unique. The driver sits on the left side in an upholstered seat only large enough to seat him comfortably. The instruments are on the left side of the dash and the foot rest is only large enough to accommodate the brake pedals so that they may be operated easily. The remaining part of the driver's compartment is perfectly open similar to the trunk-carrying arrangement on some taxicabs. It must be borne in mind that this car is much wider than a taxicab and, inasmuch as a taxi can carry a large trunk in a similar compartment, there will be so much more room in the car here illustrated. Note the unusually long and roomy compartment of the chauffeur. The door opens outwardly and to the left, at the right of the driver. The center side of this door is perpendicular, while its right side is made to fit the curvature of the body. Since this door is inside, it is not as heavy as the ordinary limousine door and when it is closed it produces the same effect in the interior as in any closed car. The foredoors are unusually wide, the one on the right side being the wider of the two, and as the step from the running board to the floor of the car is very low, entrance and exit are as easy as in any limousine, if not easier. Furthermore, one is not compelled to step immediately into the street. The placing of a mat in this miniature vestibule saves the soiling of the inclosed part of the car, which can be finished to suit any taste. This arrangement gives the interior much more room as well as the luxury of one's own living room. The rear seat holds three passengers comfortably and there may be either small chairs or folding seats, which fold into the body out of sight, for the remaining two passengers. The car is for four passengers, the six passenger body being obtained by lengthening the wheelbase. There is plenty of leg room in either of these styles, something unknown in some limousines. By having the door arrangement described above a large amount of baggage can be carried inside or out when touring, and it also gives the body beautiful unbroken sides which are moulded with the top into a graceful dome shape.

The lines of this car are perfect. Each curve bears some relation to the one next to it. From the rounded radiator to the tail light is a complete union of graceful lines and curves, giving the car a sturdy, luxurious appearance that comes only from perfect balance. The windows are sashless, and, because of their unusual width, produce practically an open car when lowered. They are raised or lowered by means of a crank arrangement. The tilted cushions are very thick and deep and there are a clock, parcel and hat racks, card cases, flower vase, an umbrella holder and small compartments built in the body for food and water bottles for long tours. As a very wide body is used, these little conveniences do not spoil the roomy interior. The graceful, oval fenders and body are of cast aluminum, while all trimmings are of polished brass. The radiator is of the rounded type and the gasoline tank, tools, tires and trunk are carried in the rear. The motor has four cylinders and has all the latest improvements. The drive is worm, making the car absolutely noiseless. Dished wire wheels are used and the front and rear springs are very long, the rear ones being underslung. The lamps are designed for this type of car and are electrically lighted as well as the dome lights in the passenger's compartment. The running boards are hung below the axles and can accommodate a trunk on each side, these being placed near the rear fenders when touring. The windshield opens outwardly on a brass frame as shown in the illustration. The driver is protected in stormy weather by curtains which fold up out of sight into the roof of the body, and he may enter or leave the car from the left side.

This car is the very last word in coach building and can be produced exactly as illustrated. Furthermore, it is practical, is strictly an automobile type and above all things is beautiful.

This car is expensive to build but its good qualities outshine the price which would not be in excess of many of the limousines now offered by our highest grade manufacturers. It is a type that will make its appearance before many years have passed.

New York City. JULIAN F. BRASOR.

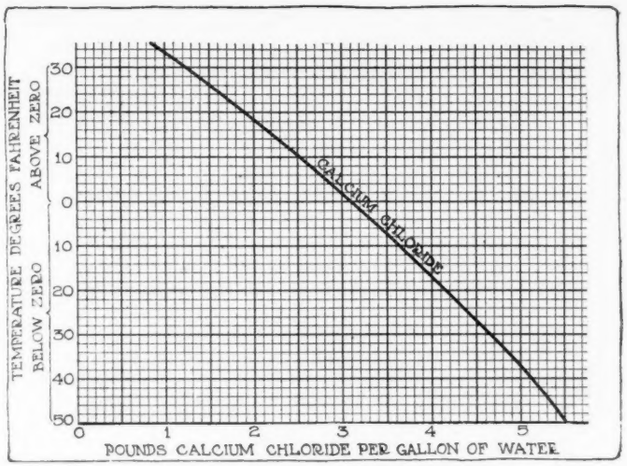


Fig. 3—Freezing point curve of calcium chloride solution

An Ingenious Starting Scheme

Editor THE AUTOMOBILE:—A few days ago I was confronted with a perplexing problem, my solution of which might be of help to automobilists. The crankpin on my engine shaft had been broken off, and I was unable to start the engine in the usual manner. By throwing in the clutch and running the automobile down hill, or with several men shoving the car until the engine started, all would have been well, but the road was flat without hills, and neither a team nor several men were handy. Reasoning that if the engine started the rear wheels, the rear wheels would start the engine, I got out the jack, hoisted one of the rear wheels, and gave it a crank. The engine started as well as in the regular way and a long wait for help was avoided.

Findlay, O. A. J. SMITH.

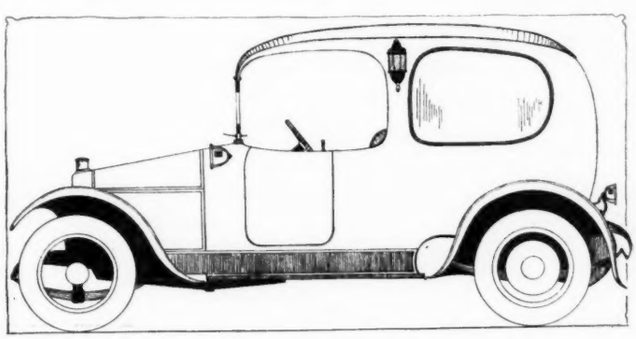


Fig. 4—Interesting limousine designed by reader

The Engineering Digest

Armored Cars with Ammunition for the Infantry on the Firing Line Now Indispensable for Subduing Retreating Enemies

Such Cars Should Be Fit for Running Rapidly with Light Loads Over Moors, Crags and Fens

WITH rapid-firing magazine rifles the principal arms of the infantry, the military problem of supplying the firing line with ammunition has become one of the utmost importance for the efficiency of an army, especially when the invasion of a hostile country is concerned. The soldiers simply cannot carry all the cartridges needed for getting the benefit of improved rifles. As, furthermore, the introduction of completely automatic re-loaders in the armies of all the great powers has become only a question of time and appropriations and will increase the rapidity of firing another 25 per cent., the organization of a service for supplying the field with ammunition claims immediate attention.

This service can be performed only by means of automobiles, according to an army officer writing in *Schweizerische Militär-Zeitung*. He proposes a small and light but nevertheless armored car whose load capacity probably could not exceed about 500 pounds, or about 10,000 cartridges, but, on the other hand, could make its runs so much oftener or could be despatched successively to different portions of an extended line.

First Sketch of Design Features

The author imagines the design about as follows: Externally the whole vehicle would look somewhat like one-half of a hen's egg 4 meters long. The driver would lie on an inclined board beside or between the ammunition boxes with only two small slits in the armor to see through. So as to give him a good view in this position, the motor should be placed in the rear, thereby also lightening the front and obviating any tendency of the vehicle to bore the front wheels into plowed or other soft and rough ground. The proposed position of the driver would enable him to operate the clutch and the brakes with his feet. Three speeds forward and reverse should be sufficient, considering the value of simplicity. The wheel gauge should be very narrow, to make it practicable to proceed over field paths and pick a course over rough ground. As the vehicle would be very low, its stability would not suffer unduly. The steel armor should be secured to the wooden board on which the driver lies, in the same manner as shields are attached to field ordnance. The wheels should be large steel disks with solid rubber tires of great width. Possibly the vehicle should also be equipped with climber-wheels, such as are used in the Austrian army for armored motor cars carrying rapid-fire guns to enable them to get over ditches and breastworks. They consist in a frame extending forward and upward in front and backward and upward in the rear, in both positions with a wheel at the extremity which relieves the normal wheels of shock and weight when an obstacle is scaled or a ditch crossed.—From *Der Motorwagen*, October 31.

[Among the discrepancies in this description it may be noticed that the shape of "one-half of a hen's egg," 4 meters long, is scarcely compatible with a narrow gauge, while in point of fact only the broad gauge permits speed on very rough ground.—Ed.]

Motor Starters as They See Them in France Where Electric Equipment Is Considered Too De Luxe for Popular Use

A Return to First Principles Contrasting with American Faith That "Nothing Is Too Good"

FULLY admitting that the starting crank in front of the motor is a relic of a past stage in automobile construction, yet very much opposed to the general introduction of starting devices which add to the weight, the complication and the cost of cars for that large majority of prospective purchasers whom European manufacturers have so far been able to reach only in a very limited degree, several writers in the French press show a decided tendency to hail with acclaim any simple device, in the line of motor starters, which does not bear the hallmark of American invention.

A hearty reception is thus accorded the mechanism shown in Fig. 1 by the editor of *Omnia*, although this mechanism seems to necessitate a rapid to-and-fro movement of a handle. Speaking of electric starters, in contrast, he says: "To be sure, electric starters are proposed, but they are costly, since they are complete electric motors and since, to the complication which they involve, there is added that of an indispensable electric storage battery." [In this oft-repeated objection to electric equipment it is apparently forgotten that the cost of it, in conjunction with mass-manufacture of automobiles, is not all that it appears to be in the retail market, and that it may be considered as one of the missions of the automobile industry to vulgarize and cheapen many articles and processes the use of which was previously restricted and for which prices have been artificially maintained at a high level no longer justified by the actual expense of producing or working them.—Ed.]

Controlled by Herzmark Cable

The new starting mechanism is in principle of the very earliest type, in which a ratchet secured to the flywheel is actuated circumferentially through a movable pawl. [A device of this class was made in New Haven in the year 1900, for example, to be used in connection with a two-cycle boat motor.—Ed.] The pawl in the French starter is attached to a flexible cable by which either a push or a pull of a few inches can be transmitted. The details of this cable, called the Herzmark, were described in The Automobile of January 11, 1912, and only minor improvements have been introduced since then. A passage from this description gives the main features of it, as follows: "The Herzmark transmission works in a drawn red copper tube . . . which is rigid, once installed in service, but may be bent into very sinuous shapes, with turns down to 2 millimeters radius. Within this tube there is placed with small play a flexible sheath wound with steel wire, and this incloses, with considerable play, a thin cable on which there is wound a helical thread of very steep pitch. At each end of the sheath, which is shorter than the copper tube, there is secured by means of a little shoulder-and-sleeve joint a brass piston of a length a little greater than that of the movement to be transmitted. These pistons are bored to admit the snug passage of the thin steel cable, the ends of which are held fast to the ends of the pistons

by means of threaded caps. The cable is tightened until the surface of the wire-winding of the sheath becomes continuous. The pistons and the sheath thus form an element which is rigid under push, while capable of bending around the turns of the conduit, and a push is transmitted by direct action of the pushed piston on the end of the sheath and from the latter upon the piston at the opposite end. A pull at one end, on the contrary, is transmitted through the cable to the piston at the other end, and from this reacts upon the sheath as a back-push."

The main additional point of interest in the new French starter lies in the action of the pawl, which is plainly indicated in the third section of the illustration. A pull brings it into engagement, while a push releases it. In the close quarters where the work is done, the avoidance of a retraction spring—by means of the Herzmark wire—is necessary, since a spring with a stroke of

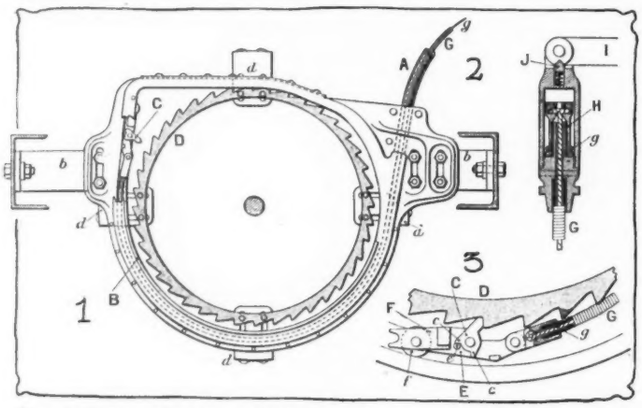


Fig. 1—Motor starter; ratchet secured to flywheel encircles clutch

2 to 3 inches takes up considerable room and would also add to the work of operation. The fastening of the operating-handle is shown in section 2 of the illustration. According to *Omnia*, November 1, a motor can frequently be started by a single pull, which, if it is vigorous, may correspond to a quarter turn of the crankshaft; and, if necessary, the pull can of course be repeated indefinitely. It is an advantage that the handle can be placed conveniently for a strong effort—between the pedals.

—

AN international contest of automobile lamps has been organized for the first two weeks of January by the Automobile Association of Belgium. Lighting power measured on a target at a given distance will count 100 points; dependability, facility of repairs and replenishment 50 points; simplicity and ease of utilization 50 points; maintenance and accessibility 25 points; elegance, minimum weight and compactness 25 points; price 50 points.

—

Cheaper Acetone Promised by Chemists and Certain Important Developments May Follow in Its Wake

IT appears from information gleaned from *Kunststoffe* and *Revue de Chimie Industrielle* that several chemical inventors have been successful during the last year in producing acetone by processes which should reduce the price of this commodity to one-half or even one-fourth of the present quotations. As acetone is the vehicle in which acetylene gas must be carried in order to obviate danger of explosions, its high cost has heretofore set narrow limits for the use of acetylene as a fuel for motors or as an illuminating gas, although the calcium carbide, from which it is derived cheaply enough, can be produced wherever coal wastes and limestone are available in the same neighborhood. The new development in acetone production, it is surmised, will remove one hindrance against the broader utilization of acetylene.

Acetone has also another field of usefulness which lies still closer to automobile interests. If the lubricating oils used for motoring are treated with acetone and those portions of the oil are removed which the acetone dissolves, the remainder is much improved, inasmuch as it has been found by careful tests conducted in Germany [reported in these columns in THE AUTOMOBILE of March 14, 1912] that lubricating oil so treated gives rise to no formation of ill-smelling, pungent gases in the exhaust of a motor, even if the oiling is not carefully proportioned to the needs. But for this purpose, too, acetone has so far been too expensive. At 25 per cent. of its present price the oil distillers may take it up.

—

Handy New Window Fastening Device Makes Thinner Doors Possible

FRENCH limousines for 1914, according to *Omnia* of October 18, where an illustration is given, have windows which rest on two long coil springs concealed in the window slot. These are just stiff enough to support the weight of the window when extended to hold it closed. The window is no longer lifted over a molding on the sill to come to rest and exclude rain. The slot can therefore be narrower. A rubber strip on the outside presses against the pane and keeps the weather out. A finger piece at the top of the window enables one to push it down against the resistance of the springs, and a transverse rod in the upper portion of the slot has a small lever at the middle and a fluted cam at each end by which the window can be fixed at any height, the cams acting against fine-toothed racks extending up along the edges of the frame. When the little lever is turned down, out of the way, the cams are set, of course.

It is an advantage of this fastening that the window cannot rattle nor let water into the slot, being pushed tightly against the sash. Also, the springs aid in raising it.

—

Progress of Benzol Campaign in Germany

AN announcement from the German Benzol Association now appearing broadcast in the German automobile journals gives an idea of the results which have been accomplished by united action in favor of this fuel. The statements made run about as follows:

The benzol produced from German coal is now recognized as the most economical and most dependable fuel for motors of all kinds. It has almost completely displaced gasoline for stationary motors and a similar change is in progress with regard to automobiles. Every new motor has now a carbureter which admits of the use of benzol by means of suitable adjustment. According to the unexceptionable demonstrations made by thousands of car owners, led by Prince Henry of Prussia, the power derived from benzol is, weight for weight, equal to that obtained from the best gasoline. In some cases it is superior, as when the work involved demands much climbing of steep grades. It is used exclusively for Zeppelin airships after exhaustive comparative tests. The motor ploughs which are now coming into such general use are mostly driven with benzol. It is 40 per cent. cheaper than gasoline of the best grade. Seventy German benzol factories are united in the Association and all produce a fuel of the same composition. Their production now aggregates 140 million kilograms and will be still further increased concurrently with the increasing production of coke.

—

UNIFORM Road Rules—The Automobile Club of Germany has addressed a circular to the affiliated clubs in other countries with a view to having ways and means considered for getting uniform rules of the road adopted in all countries. In England, Luxemburg, Portugal and Sweden vehicles turn off to the left and pass to the right, while in all other countries in Europe the opposite rule obtains, and in some of these, says *Automobile Belge*, there are regions where you turn to the right in some cases and to the left in others. Any hope of a universal agreement is as vain as it is inoffensive, adds this journal.

Disco Equipment a Double-Deck Design

Starter and Generator Combined in One Casing—Separate Armatures and Fields

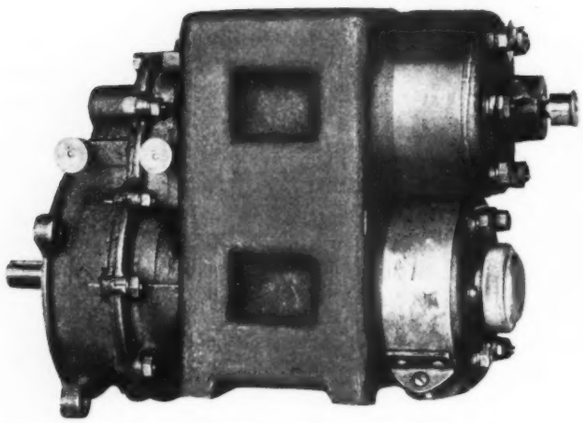


Fig. 1—Disco combined electric starting motor and lighting generator

THE so-called double deck electric outfit, consisting of a starting motor and charging generator combined in the same casing, is a type that is meeting with increasing favor because of its claims to ease of mounting and simplicity of mechanical connection to the engine. The type of machine referred to is that in which the two units are electrically separate, that is, where each has its own field and armature, although so far as the advantages stated above are concerned, the combination machine proper, in which the field magnet and armature is common to both purposes, is of course equally applicable.

A double-deck machine by the Disco Co. is shown in Fig. 1. This is designed for application to the side of the gasoline engine, connecting by chain to the pump shaft as shown in the installation on the American, Fig. 3. It is to be particularly noted that this chain is the only connection between the machine and the engine, transmitting the energy from the motor for starting the engine and, when the latter is running, taking the drive from the pump shaft to the generator half of the combination. The necessary disconnection between the generator and motor units is obtained by the use of a roller clutch contained within the gear case at the end of the double-decker.

It will be understood that in a generator-motor equipment it is necessary to have a fairly high gear ratio between the motor and the engine in order to apply the torque required to move the standing engine, but that, on the other hand, once the engine is running a much lower ratio is required for the generator drive. In other words, the generator could run satisfactorily at pumpshaft speed, but the motor must be geared down so that on exerting its starting torque it can act through the high leverage represented by the reduction gear. The method of meeting these requirements, while having only one shaft projecting from the combination for the chain drive, is shown in the section of the Disco double-decker, Fig. 2.

The motor occupies the upper position and carries a pinion P keyed to the end of its armature shaft. This pinion transmits the drive first to an intermediate shaft S and thence by the second pinion P1 to a large gear wheel forming the outer casing of an over-running roller clutch R. The inner or driven member of this clutch is mounted rigidly on the armature shaft G of the generator and carries the drive through to the outer chain wheel C when cranking the engine. As soon as the engine commences to fire the speed runs immediately up above that represented by the motor at the roller clutch and the latter comes automatically out of action, allowing the generator to take its drive in the normal way from the pump shaft through the chain wheel C, while the motor above comes to rest as soon as the switch is released.

Magnetic Fields Are Separate

Although the magnet casing for the two units is a single casting, the magnetic circuits of the two fields are quite distinct. A dividing wall passes through between the two sections. Each machine is two-polar with the poles cast integral with the magnet casing. The armatures are also constructionally the same, though the winding is, of course, heavier on the motor.

The generator is shunt wound, and its output is controlled by a combination of armature reaction and a bucking coil, while the battery is protected from discharging back through the generator by means of a simple magnetic cut-out. This cut-out has

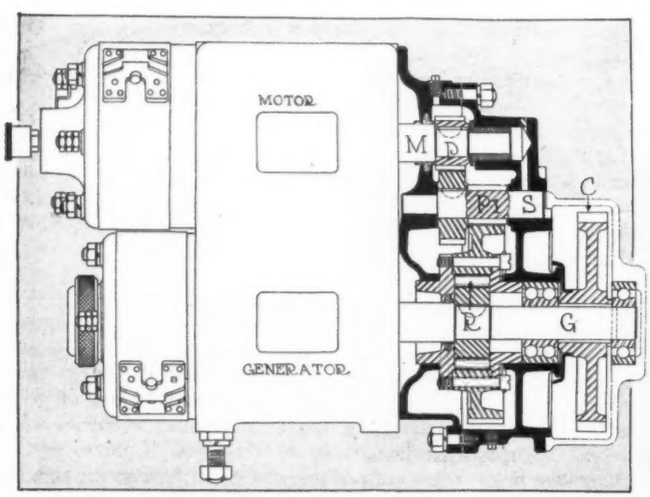


Fig. 2—Section through double-decker, showing reduction gear

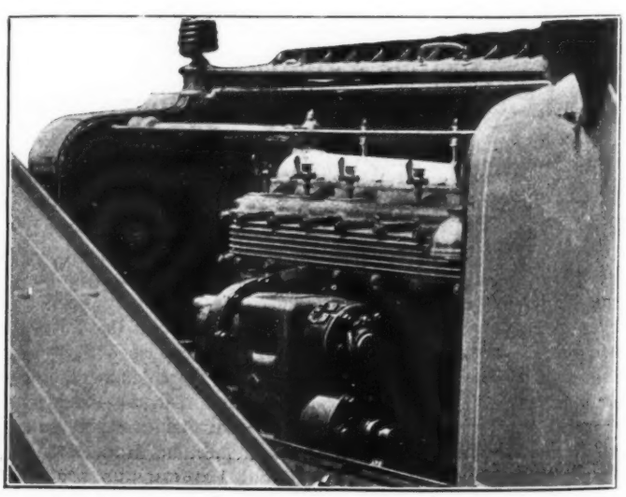


Fig. 3—Application of Disco double-deck outfit to the American

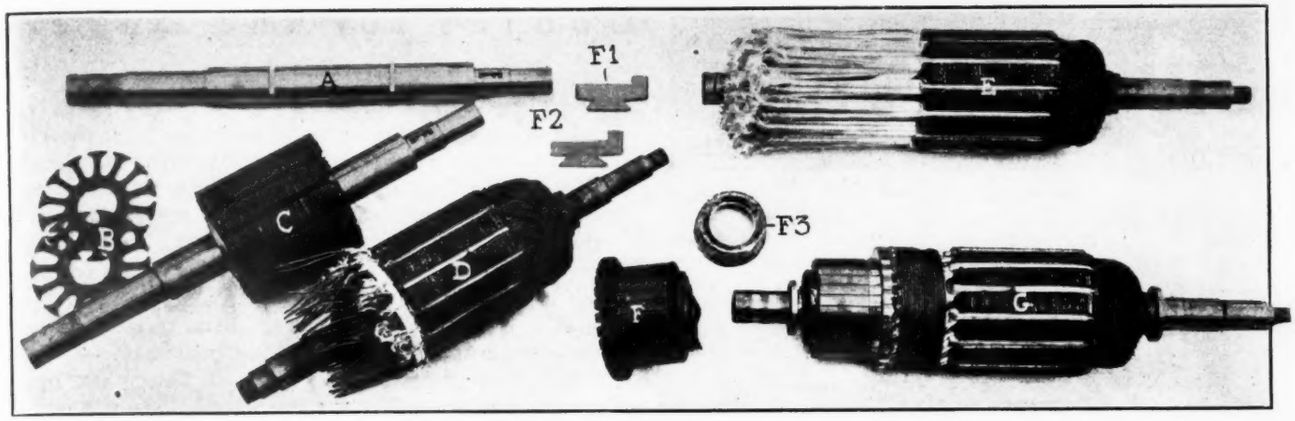


Fig. 4—Showing construction and winding of laminated drum armatures for the motor and generator of the Disco double-decker

two sets of contact points, one set of carbon and one of copper.

The entire machine dismantled is shown in Figs. 4 and 5, which illustrate the processes of manufacture. Dealing first with the armature, Fig. 4, A depicts the steel shaft ready to take the soft iron stampings B, which are threaded over it, compressed and keyed in place as shown at C. The winding is then applied, heavy wire being used for the motor armature E and thin wire for the generator D. It will be observed that the ends of the windings project loosely from one end of the stamping, ready for attachment to the commutator F. This latter is built up from a number of copper segments F1 mounted on a steel sleeve with similarly shaped micanite insulators F2 separating the segments. The whole is clamped together between two mica V rings F3, so that each segment is electrically isolated.

It now only remains for the commutator to be keyed to the shaft and the ends of the armature coils soldered to the segments, trimmed and bound as shown on the finished armature G.

In Fig. 5, which shows the constituent parts of the magnet casing, the magnet of a separate machine is illustrated. The double-deck machine under consideration consists simply of two of these magnets cast one on top of the other so that the methods of mounting the coils and fitting the end cover is the same. The magnet of both generator and motor has two poles, P1 and P2, and on these are placed a pair of field coils M or G. The former is of fine wire for the generator, and the latter a few turns of copper strip for the motor field. The large size of the field winding on M is necessary to carry the entire current passing from the battery to the motor when starting.

Carbon Brushes Fitted in End Cover

At E is shown an interior view of the end cover or bearing. The carbon brushes which bear on the commutator are fitted in brush-holders B, bolted to the casing. Light springs on the brush-holder keep the brush in continuous contact with the commutator. Large inspection holes are provided in the end cover over the brushes and in the finished assembly, as shown in Fig. 1. These are covered by steel bands completely inclosing the machine.

The gearing at the opposite end is arranged to drive the generator at twice engine speed while the motor reduction, which depends on the engine fitted, varies between 11 to 1 and 30 to 1. The total weight of the double-decker is about 70 pounds. When built separately the motor weighs 26 pounds. The output of the generator varies with the speed of the car. When wound for 6 volts, which is the most common voltage, about 10 amperes are produced at a car speed of 15 miles per hour up to 14 or 15 amperes on the higher speeds.

As regards the performance of the motor the curves, Fig. 6, show the torque exerted in relation to the speed and amperes drawn. It is claimed that the starting torque and ability of the motor is sufficient to turn a big six-cylinder engine over at 150 revolutions per minute.

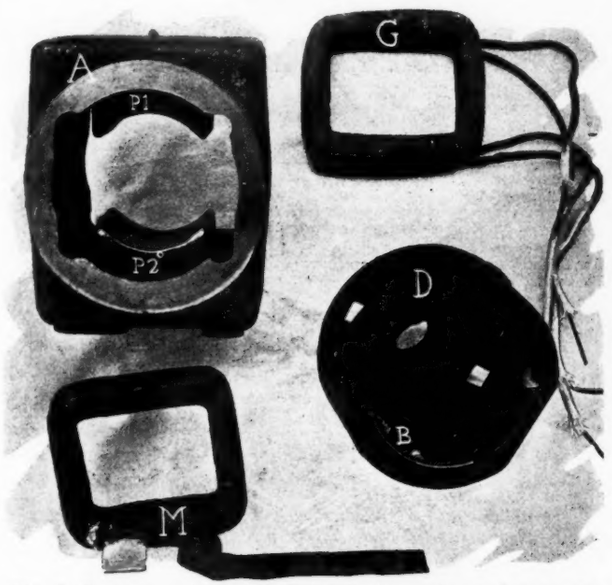


Fig. 5—Magnet, end bearing and coils for motor and generator, showing the heavy winding M of the field coil for the motor, the finer wound coil G for the generator, and the location of the carbon brushes B inside the end cover

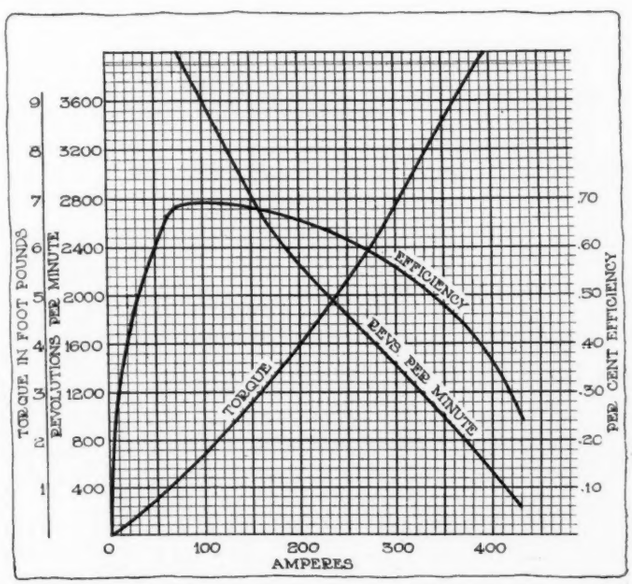


Fig. 6—Characteristic curves of Disco electric starting motor, showing the torque exerted in relation to speed and current

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Advertising to Sell

THE car maker with a high-class product should follow a different trend in advertising from the maker building a medium or low-priced machine. The former has filled his factory with machines to produce the greatest accuracy in workmanship. He has had the machine maker build special types to manufacture a part that will be the final word in accuracy. He has equipped expensive physical and chemical laboratories to carry his experimental corps through the entire gamut of scientific research for the best in metallurgy. And with all done he has got accuracy of workmanship; he has got the finest in materials and he has got the best that can be had in inspection and testing. Then, with all these obtained, why hide the light under a bushel? Let the public know these merits. Tell the public that accuracy is the bone and sinew of the car and its parts. Tell the public that the metallurgy of the car cannot be exceeded. Tell the public about the care in assembly and the care in inspection. How few car buyers and car owners really have any clearly defined conception of the difference in accuracy and difference in materials and in workmanship between many of the high-priced cars and the low-priced ones? These buyers know that there is some vague difference, but as to the potentialities of it they are quite ignorant.

The maker should get the thought of accuracy into the minds of the public, get the public to think accuracy, to think good materials, to think good inspection, to think good testing. Then results may follow.

Bodies for the Buyer

THE British body builder, through sheer necessity, has been compelled to build bodies to meet the requirements of owners, bodies that meet individual requirements, rather than those laid out according to laws of averages and intended for any person between Portland, Me., and Seattle. This necessity of building to meet the individual, occasioned by the fact that the British buyer prefers to purchase a chassis and add the body and its equipments himself, has resulted in a greater versatility of design and equipment than is found with body builders of other countries. This is not due to any special originality on the part of many of the British body builders, but rather to their being good imitators of general lines and exceedingly adept in working out the finer details that appeal to the whims of the individual. The body lines seen at Olympia are adaptations of the streamline German effect introduced some years ago, but the Britisher has improved upon these by the tubular side construction in which the roominess inside is increased and a better torpedo exterior obtained.

The adoption of the all-steel body shell, in which all of the panels are autogenously welded together, has made it possible to carry the tubular side and rounded corners to an extreme. In fact, the curve is everywhere and the straight line nowhere. The one-piece body has reduced weight and added strength, working out as it does for the general good.

The convertible body is coming into its own, if Olympia can be taken as a criterion, for now the cabriolet has been joined by the semi-cabriolet, the saloon cabriolet and in the landau ranks are such new types as three-quarters landau, saloon landau, limousine-landau and other types. The campaign with the convertible body has been to eliminate rattle with the top down and rattle with the top up in old vehicles. The art of the coach builder has come to the front in this respect and today the folding top of the cabriolet is so artfully designed and executed that when up it affords the comforts of the limousine and when folded can scarcely be distinguished from an open torpedo touring car.

The saloon body in limousine, landaulet, coupé and cabriolet lines is one of the innovations of the year, and a design which must win out in that it is designed to fill a place as a family car that can only be equalled by the single-compartment type of body seen in all too few numbers in America during the past few seasons. In this body the ability to remove the partition in rear of the driver and obtain a one-compartment vehicle is a step in harmony with self-starters and automatic lighting, in that it enables the owner with his friends to use the car with a luxury almost as great as that with the limousine and driver.

Several of our dealers in high-priced cars have been doing much during the last 3 years in adapting the body to the buyer and his needs. The car maker has shipped his car with a skeleton body minus upholstery, cushions, etc., these being fitted by the dealer to meet the buyer's dictation. More of this will be done in the future, because it is only sensible that, where a buyer expends $2,000 or $4,000 for a vehicle of transportation, it should at least be comfortable to ride in.

New York and Chicago Show Space Taken

Only Room Not Alloted Is That Set Aside for the Electric Vehicle Manufacturers

NEW YORK CITY, Nov. 24—With the exception of the space allotments to the electric car manufacturers all details of issuing show space has been accomplished and there remains not one inch of space to be had for either the New York show or the Chicago show. There is a long list of applicants for both exhibitions and the only possiblity of securing space is when an exhibitor withdraws. Manager S. A. Miles has just returned from Chicago where he busied himself with plans concerning the Chicago show. Next week Mr. Miles will announce in more detail the plan of decoration to be used for both the shows.

The motorcycle exhibitions hold promise of creating even more than they did at last year's show. Twelve different motorcycle concerns have been allotted exhibition room for the Palace show. They are as folows:

Exhibitors	Address
Aurora Auto Machinery Co.	Chicago, Ill.
Consolidated Mfg. Co.	Toledo, Ohio
Davis Sewing Machine Co.	Dayton, Ohio
Emblem Mfg. Co.	Angola, N. Y.
Excelsior Motor Mfg. & Supply Co.	Chicago, Ill.
Harley Davidson Motor Co.	Milwaukee, Wis.
Hendee Mfg. Co.	Springfield, Mass.
Miami Cycle & Mfg. Co.	Middletown, Ohio
Pope Mfg. Co.	Hartford, Conn.
Reading-Standard Co.	Reading, Pa.
Schickel Motor Co.	Stamford, Conn.
Henderson Motorcycle Co.	Detroit, Mich.

The following exhibits have been added since the last report:

Taylor Mfg. Co.	Montclair, N. J.
Yale Steel Stamping Co.	Ostburg, Wis.
G. B. Sales Corp.	1790 B'dway, New York
Robby-Grace Corp.	1926 B'dway, New York
Dann Oil Cushion Co.	2246 Indiana Ave., Chicago
Swyers & Lorch	Pittsburgh, Pa.
Stewart Auto Academy	231 W. 54th St., New York
Presto Inter-Rim Co.	Boston, Mass.
Nat. Metal Molding Co.	Fulton Bldg., Pittsburgh
Hans Motor Equipment Co.	La Crosse, Wis.
Eiker Carbureter Co.	1790 B'dway, New York
C. N. Peacock & Co.	Rutherford, N. J.
Dayton Rubber Mfg. Co.	Dayton, Ohio
Elec. Spk. Appliance Co.	30 Church St., New York
Colonial Bell Sales Co.	Cleveland, Ohio

This list shows that the Dayton Rubber Mfg. Co. will exhibit making one more exhibit from the tire companies. The list to date is as follows: Pennsylvania Rubber Co., Empire Rubber & Tire Co., Double Fabric Tire Co., McGraw Tire and Rubber Co., Knight Tire and Rubber Co., Overman Tire Co., and the above named concern, the Dayton Rubber Mfg. Co.

Providence Show Opens Well

PROVIDENCE, R. I., Nov. 22—The first motor show of the season opened its doors tonight at the armory with a big attendance. There were many people present from surrounding cities and towns, and the exhibition presented an attractive spectacle. For the first time at a show there is a cyclecar on exhibition, the Imp made by the McIntyre company. The show will continue all next week.

Bosch Prominent at Olympia

NEW YORK CITY, Nov. 24—Of the 534 gasoline-powered cars exhibited at the Olympia Show, London, 450, or 84.27 per cent. employed the Bosch magneto for ignition. The balance of 15.73 per cent. was divided among ten other manufacturers of magnetos, the nearest to Bosch having 7.6 per cent. At the Paris exhibition, of the 483 applied magnetos, 393 were Bosch.

Many Sales at Electric Salon

BOSTON, MASS., Nov. 20—The first Electric Motor Salon ever held in Boston closed its doors last night after three days and evenings—the regular slated time—and all the members of the Electric Motor Car Club of Boston were well satisfied with results. The ball room of the Copley Plaza has been engaged again for next year for another show. Some of the members are in favor of semi-annual exhibitions in spring and fall. While the exhibitors did not expect to make many sales they were surprised at the results. The show brought to the hotel many people prominent in social circles, and visitors from other cities staying there went to the Salon. The members of the reception committee took them in charge and after making the rounds left them to make inquiries from the salesmen. When the Salon closed one of the officials stated that he had figured up an average of about two sales to each of the exhibitors and many splendid prospects from people a number of whom own gasoline cars, but are about convinced that an electric may be a good addition for town motoring. The Electric Motor Car Club will meet next week when further details will be reported.

State Commissions Discuss Laws

NEW YORK CITY, Nov. 21—The meeting of the state commissions for uniform motor vehicle legislation was held in this city at the Hotel Belmont, last night. Outside of discussing existing laws as outlined in a book of ninety pages, compiled by the New Jersey State Commission, very little was done. Charles T. Terry addressed the meeting and said that automobile legislation is class legislation of a kind that existed in relation to no other users of the roads and that it ought to be wiped out, except as providing a means of identification of the car, made necessary solely by the fact that it had greater speed than other road vehicles. A committee, which is to report later on suggestions for a uniform law, was appointed.

Demonstrator Does Not Require License

BUFFALO, N. Y., Nov. 25—Members of an automobile company are not required to take out a chauffeur's license under decision of County Judge Harry L. Taylor, whose opinion was given in reversing the city court conviction of Charles A. Hamilton, member of local automobile firm, who was arrested for driving an automobile here without a license. Mr. Hamilton was demonstrating a car and his contention was that as a member of the automobile company he was a part owner of the machine. Judge Taylor took the same view and set aside the conviction.

Ohio Road Law Upheld

COLUMBUS, O., Nov. 24—By an almost unanimous decision of the Ohio Supreme Court the constitutionality of the Hite road law in Ohio was upheld by the highest tribunal in the state recently. The Hite law provides for a state-wide levy of .5-mill for the purpose of building the system of inter-county highways. The decision was the result of the failure of R. E. Edmondson, auditor of Hamilton county, Ohio, to put the levy in the tax budget of that county and a mandamus suit was instituted by State Auditor A. V. Donahey. Included in the suit were the prosecuting attorney of Hamilton county and Mayor Hunt, of Cincinnati, who are also on the budget commission.

New sticker sent out by the management of the New York and Chicago Shows

Decision Reversed on International

Court Order Releases Company from $50,000 Bond Obligation as Well as from $500,000 Unsecured Loan

NEW YORK CITY, Nov. 21—On technical grounds, Judge Garretson, of the Brooklyn Supreme Court, has reversed his recent decision granting the continuance of the injunction *pendate lite* obtained by minority interests of the International Motor Co. through an action brought by G. E. Blakeslee, a stockholder. Judge Garretson granted a rehearing upon application of attorneys for the company, and reversed his opinion on a technicality that the corporation, as such, was not involved in the charges made by the minority in regard to the report upon which the Saurer Co., was acquired by the International.

The order releases the company from the necessity of giving a bond for $50,000 to protect the plaintiff for whatever loss he might sustain pending the trial of the suit to dissolve the merger.

It is also relieved of any obligation to the court in connection with the $500,000 unsecured loan allowed in the original decision. This decision does not affect the suit for dissolution, but the attorneys for the minority have filed an appeal from the reversal in the Appellate Division of the Brooklyn Supreme Court.

President Vernon Munroe of the corporation says that plans have been completed under which the existing or future merchandise creditors of the company will have unusual protection for credit extended. With the exception of bills for merchandise, the company will have practically no obligations to meet for the next 3 years beyond its current requirements. The company's annual business has grown until it now reaches approximately $4,000,000.

New York Taxicab Law Upheld

NEW YORK CITY, Nov. 21—A decision upholding the constitutionality of the Public Hack ordinance was rendered yesterday. The privilege of monopolizing cab stands at the principal hotels of this city was taken away from the Taxicab trust, which it is claimed paid half a million dollars a year for it. The new ordinance prohibits private hack stands at hotels and lowers the rate of 80 cents for the first mile to 50 cents for the first mile. The taxicab owners and the hotel proprietors will carry the matter to the Court of Appeals.

Auto Supply Wins Patent Suit

NEW YORK CITY, Nov. 25—In a suit brought by Charles Fisher against the Automobile Supply Mfg. Co., Brooklyn, N. Y., for alleged infringement of the Fisher patent on flexible tubing the United States Circuit Court of Appeals has decided that: "In view of the prior state of the art the patent was invalid." This decision confirms the one handed down by the District Court.

The original complaint alleged infringement of the Schmidt & Grundman patent, number 969,660, owned by Mr. Fisher, and demanded judgment for damages of $6,000. The flexible tubing in question is manufactured by the Auto Supply Co. for inclosing speedometer and other flexible shafts.

Chamber of Commerce to Change Name?

NEW YORK CITY, Nov. 24—The Automobile Chamber of Commerce, Inc., will apply to the Supreme Court of the State of New York, at a special term to be held in the county of New York, on December 15 for an order authorizing it to change its corporate name to National Automobile Chamber of Commerce, Inc.

Willys-Overland's Prosperous Year

NEW YORK CITY, Nov. 24—In the last fiscal year the Willys-Overland Co. produced and sold a total of over 33,000 cars. This year the management has plans shaped for a production of 45,000 to 50,000 cars. It is understood that at present the Overland factories in Toledo, O., are turning out at the rate of 190 new cars daily. In its year to June 30 last, the company made net profits of better than $5,500,000, the exact amount figuring out 110 per cent. on the preferred, which is the security owned by private investors. The company has jumped to the front in a remarkably short time. The 1912 year witnessed a production of 22,000 cars; 1911 figures were not much over 14,000 cars, and 1914 is coming along with a 220 per cent. gain over the 1911 figures.

To Make Electrics for $750

DETROIT, MICH., Nov. 24—It has remained for E. LeRoy Pelletier to bring out an electric vehicle at a low price. Mr. Pelletier, who is the moving spirit in the Tiffany Electric Co. which took over the Flanders Mfg. Co. business, intends to offer the public an electric vehicle of up to date design at about $750 complete. The machine which is being designed, known as the Tiffany Bijou, is said to have a mileage ability of 100 miles per charge. Full details of this low priced electric are promised for next week.

Moon October Shipments Double Last Year

ST. LOUIS, Mo., Nov. 24—A statement issued this week by the Moon Motor Car Co., of St. Louis, showed that the actual shipments of the company during the month of October this year, almost doubled those of the same month last year. The total shipments for October this year were: $89,414.05, as against $47,612.58, a gain of $41,801.47. For the three months, August, September and October this year the total shipments were $190,451.69, while the figures for the same months last year were $125,328.95. This is a gain of $65,122.74 for this year over 1912.

CLEVELAND, O., Nov. 24—The Cleveland branch of the H. W. Johns-Manville Co. has recently been obliged to provide larger quarters for several of its subsidiary offices. The Columbus office and contract department are now located on the ground floor of the new seven-story fireproof Peters Power Bldg., 45 West Long street. The Toledo office and warehouse have been moved to 213 Water street.

Automobile Securities Quotations

The smallest day's business in its history was recorded by the New York Stock Exchange on Monday. A dullness seemed to pervade the automobile securities markets as there was little doing in the way of trading. The quotations remained on an average within a point or two of last week's quotations. Splitdorf preferred rose 5 points and Firestone common dropped 5 points.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	180	191	200	215
Ajax-Grieb Rubber Co., pfd	100	104	98	105
Aluminum Castings, pfd	100	102	98	101
Chalmers Motor Company, com	..	..	..	95
Chalmers Motor Company, pfd	..	..	92	96
Consolidated Rubber Tire Co., com	11	14	30	35
Consolidated Rubber Tire Co., pfd	50	60	90	94
Firestone Tire & Rubber Co., com	290	295	245	254
Firestone Tire & Rubber Co., pfd	105½	107	102	104
Garford Company, pfd	99	100	80	90
General Motors Company, com	37	38	36	37
General Motors Company, pfd	79	79½	72	76
B. F. Goodrich Company, com	70	70½	18	20
B. F. Goodrich Company, pfd	106¾	107¼	80	83
Goodyear Tire & Rubber Co., com	450	455	..	245
Goodyear Tire & Rubber Co., pfd	104½	105½	96	96¼
Gray & Davis Co., preferred	..	..	96	102
Hayes Manufacturing Company	..	90	..	..
International Motor Co., com	20½	22½	..	5
International Motor Co., pfd	74	78	..	15
Kelly-Springfield Motor Truck Co., com	..	..	50	60
Kelly-Springfield Motor Truck Co., p d	..	..	90	101
Lozier Motor Company, com	..	..	..	16
Lozier Motor Company, pfd	..	..	..	92
Maxwell Motor Co., com	..	..	2¼	2¾
Maxwell Motor Co., 1st pfd	..	..	17	19
Maxwell Motor Co., 2d pfd	..	..	5½	6½
Miller Rubber Company	143	147	120	130
New Departure Mfg. Co., com	..	..	168	171
New Departure Mfg. Co., pfd	..	..	103	107
Packard Motor Company, pfd	105½	107½	90	94
Palmer & Singer, p'd	..	..	..	65
Peerless Motor Company, com	..	..	15	25
Peerless Motor Company, pfd	..	..	75	85
Pope Manufacturing Company, com	27	29	1	3
Pope Manufacturing Company, pfd	70	72	10	20
Portage Rubber Company, com	..	..	..	35
Portage Rubber Company, pfd	..	..	..	90
Reo Motor Truck Company	8¾	9½	6⅛	7⅝
Reo Motor Car Company	19½	21½	..	15⅞
Rubber Goods Mfg. Co., pfd	105	108	100	106
Russell Motor Car Co., com	..	..	..	40
Russell Motor Car Co., pfd	..	..	..	70
Splitdorf Electric Co., pfd	..	..	50	55
Stewart-Warner Speedometer Co., com	..	..	55	60
Stewart-Warner Speedometer Co., pfd	..	..	94	98
Studebaker Company, com	42	43½	16	18
Studebaker Company, pfd	94	96	66¼	69
Swinehart Tire Company	99	101	78	80
U. S. Rubber Co., com	..	..	53	55
U. S. Rubber Co., 1st pfd	..	..	99	99¾
Vacuum Oil Company	..	..	84	87
White Company, preferred	105	108	104	110
Willys-Overland Co., com	..	..	60	63
Willys-Overland Co., pfd	..	..	82	88

Goodrich Reduces Prices on Tires

Cut Rendered Possible By Improved Methods of Manufacturing—Several Other Big Concerns To Follow Suit

NEW YORK CITY, Nov. 24—A reduction in tire prices that affects the consumer more than it does the dealer was announced today by the Goodrich company. The drop is brought about, it is declared by improved methods of manufacturing and changed conditions in the rubber and other markets. No average per cent. of reduction can be given, for this varies with the sizes according to manufacturing cost; but the following table of comparisons gives an idea of the old and new prices:

			Inner Tubes	
Casing Size	Old Price	New Price	Old Price	New Price
30 x 3	$12.25	$11.70	$2.90	$2.80
30 x 3½	18.05	15.75	3.90	3.50
34 x 4	29.80	24.35	5.65	4.90
36 x 4	31.75	25.95	5.95	5.20
36 x 4½	40.05	35.00	7.35	6.45
37 x 4½	41.20	36.00	7.55	6.60

The Firestone and Fisk companies, it is expected, will follow suit about December 1, although just what reductions will be made by these concerns have not been announced. No statement has been made by the U. S. Tire and the Goodyear companies as to whether they intend to meet the price changes announced by the other companies.

N. Y. Men to Build Diesel Engines

NEW YORK CITY, Nov. 25—Frank A. Vanderlip, it was announced in Auburn, recently, and other New York capitalists will begin, in a big Auburn plant, the manufacture under the sole American rights of the Diesel engine. The company starts with $2,500,000 capital. Mr. Diesel, the inventor, recently committed suicide abroad.

Evinrude May Build Cyclecars

MILWAUKEE, WIS., Nov. 21—Ole Evinrude of Milwaukee, inventor of the famous Evinrude detachable rowboat motor, has sold his interest in the Evinrude Motor Co. of Milwaukee at a figure said to be between $125,000 and $150,000 and it is reported on good authority that he intends to devote his future attention to cyclecar development.

Hood Rubber Capital Increased to $3,500,000

WATERTOWN, MASS., Nov. 25—Stockholders of the Hood Rubber Co. authorized an issue of 10,000 shares of preferred stock at par, $100, increasing the total authorized stock to 35,000 shares, 25,000 preferred and 10,000 common. Capital is now increased from $2,500,000 to $3,500,000. Directors are authorized to issue this new stock from time to time, for cash, at not less than par.

Chicago Electric Reorganizes to Expand

CHICAGO, ILL., Nov. 22—A desire for increased production, sales expansion and an invasion of the electric commercial field has resulted in the reorganization of the Chicago Electric Motor Car Co., which for the past 2 years has maintained a factory and manufactured an electric pleasure car in this city.

Carl A. Neracher, formerly chief engineer of the Willys-Overland Co. and A. L. Garford, designer of the truck which bears his name, are prominent factors in the reorganization of the company. Mr. Neracher succeeds F. J. Newman, who because of ill health has been inactive for some time, as president of the company and will also serve as chief engineer. Mr. Garford at the present time is only a director of the company but he will probably serve in a more active capacity when several plans, now in the formative stage, are carried out.

A subsidiary company, as yet unnamed, has been incorporated in Toledo, O. It is the intention of the officers to erect a plant in that city which will be run in addition to the local factory. When this plant is established it is probable that Mr. Garford will be in charge.

Although the company will concentrate on the manufacture of pleasure cars, tripling the present production, at this time, eventually a line of commercial cars will be added and Toledo will probably be the truck manufacturing center for the company.

Together with the announcement of reorganization, comes an announcement of price reduction. The four-passenger model, which formerly sold at $3,000, now is offered at $2,500 and the five-passenger car, formerly listed at $3,300, now will sell for $2,800. Increased production is the reason advanced for the price reduction. It was reported along motor row that the company planned to build a popular-priced car to sell in the neighborhood of $1,000 but this is denied by the officers.

Excepting the retirement of Mr. Newman, little change in the personnel of the executive force has resulted from the reorganization. Gail Reed has been made secretary of the new company in conjunction with his duties as manager of Chicago sales and contingent territory. Penrose Reed is general sales manager. Albert F. Leopold, Albert Meyer and H. Sulzberger, local financiers, remain as stockholders, although it is reported that they have increased their holdings. Mr. Leopold represents the Chicago interests on the directorate.

R. C. H. Sale Still Hangs Fire

DETROIT, MICH., Nov. 24—The R. C. H. Corp. sale is still hanging fire, for although the property was virtually disposed of to the Harris Bros. Co. on November 22, by Referee in Bankruptcy, Lee Joslyn, for a guarantee of $240,000 plus liabilities amounting to $28,000, bringing the total bid to about $268,000, this bid was raised by some of the interests which made bids at the first sale when the matter came up for confirmation in the bankruptcy court this morning. In the light of these developments, the sale was held open until 2 p. m. Wednesday, Nov. 26.

Standard Motor Truck Gets Dyer License

NEW YORK CITY, Nov. 25—The Enterprise Automobile Co. has issued a Dyer license to the Standard Motor Truck Co., Detroit, Mich. Mr. Dyer recently visited the factories out in Indianapolis and Detroit and he states that he has pending one or two other contracts for the license concerning the direct drive, the transmission, the H-plate and the unit-power plant, covering the patent Nos. 921,963, 885,986, 657,650 and 676,223.

Market Changes of the Week

A lack of snap pervaded the markets last week. Quiet conditions ruled in most of the markets. There seems to be little disposition in the trade to engage in speculative operations at present. This is especially so in the crude rubber market. Fine up-river Para dropped this week to $0.75 at a loss of $0.04. This decline really reflected that of abroad. There was an absence of new developments in the market for scrap rubber last week, though tire scrap had a slight gain of $0.00 1-4. Tin was dull, heavy and lower in all positions at New York and London on Monday. A sale of 600 tons was reported at the Straits. Tin suffered a drop in the local markets of $0.75 per ton. Antimony broke its usual quietness and dropped to $0.06 1-8 at a loss of $0.00 1-8. Both electrolytic and Lake copper dropped in prices, the former $0.00 1-2 and the latter $0.00 3-4. Lard oil suffered a loss of $0.05.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Change
Antimony	.06¼	.06⅛	.06⅛	.06⅛	.06⅛	— .00⅛
Beams & Channels, 100 lbs.	1.415	1.415	1.415	1.415	1.415	.....
Bessemer Steel, ton	20.00	20.00	20.00	20.00	20.00	.....
Copper, Elec., lb.	.15¼	.15⅛	.14⅞	.14¾	.14¾	— .00½
Copper, Lake, lb.	.15¾	.15¼	.15⅛	.15⅛	.15	— .00¾
Cottonseed Oil, bbl.	7.10	7.12	7.09	7.09	7.10	.....
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.....
Fish Oil Menhaden, Brown	.38	.38	.38	.38	.38	.....
Gasoline, Auto, 200 gals.	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime	.93	.93	.93	.93	.93	.....
Lead, 100 lbs.	4.30	4.30	4.30	4.30	4.25	— .05
Linseed Oil	.48	.48	.48	.48	.48	.....
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	20.00	.....
Petroleum, bbl., Kansas crude	1 03	1.03	1.03	1.03	1.03	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.62	.62	.62	.62	.62	.....
Rubber, Fine Up-River Para	.79	.78	.76	.76	.75	— .04
Silk, raw Italy	....	5.00	....	....	5.00	.....
Silk, raw Japan	....	3.95	....	....	3.93	— .02
Sulhpuric Acid, 60 Baume.	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	40.00	39.80	39.75	39.50	39.25	— .75
Tire Scrap	.05¼	.05¼	.05½	.05½	.05½	+ .00¼

Muncie Gear Works Add $200,000

Capital Is Now $500,000—Creditors Receive $23,000

INDIANAPOLIS, IND., Nov. 24—A reorganization of the Muncie Gear Works, Muncie, which went into the hands of a receiver some time ago, has taken place and the capital stock has been increased from $300,000 to $500,000. Thomas W. Warner, of Toledo, has become president and general manager of the concern. Under the direction of court $230,000 of preferred stock has been given creditors in settlement of their claims, where they were willing to accept such settlement. A cash settlement of claims aggregating more than $35,000 has been made with $7,834.75 to creditors who would not accept preferred stock. Dr. W. A. Spurgeon has been elected vice-president succeeding Hugh L. Warner and J. Roy Goethus, secretary-treasurer, succeeding D. O. Skillen. Both Warner and Skillen retain their interests in the company. The plant will resume full operations following a meeting of the directors this week.

Seventy-five at Jeffery Conference

KENOSHA, WIS., Nov. 21—Seventy-five salesmen and jobbers, representing the new Jeffery line, gathered at the factory of The Thomas B. Jeffery Company, Kenosha, Wis., last week for a conference at which announcement was made of the personnel of the new sales organization, the new sales policy and the schedule of deliveries on the new cars. The appointment of E. S. Jordan, as general sales manager, and H. C. Hill, as assistant general sales manager, was announced and territorial assignments were made to various district managers and the salesmen who work under them.

The output of the Jeffery factory has been doubled and dealers are being appointed in all sections of the country. The deliveries of the Six have been underway for some time and deliveries of the Four started this week. A night shift has been put on at the Jeffery works and the orders for immediate delivery, it is estimated, will take care of the output of the plant at least until show time.

Among those present at the conference were: J. A. Cramer and G. Cramer, Buffalo, N. Y.; J. L. Frick, Jamestown, N. Y.; H. A. Wagener, Penn Yan, N. Y.; F. R. Luescher, Rochester, N. Y.; L. G. Martin, Pittsburg, Pa.; R. L. Butler and F. E. Devlin, Philadelphia, Pa.; G. E. Matteson and J. S. Hurley, New York City; W. H. Barger and S. D. Leuty, Cleveland, Ohio; J. T. Lloyd, Little Rock, Ark.; A. J. Kleinmeyer, San Francisco, Cal.; J. H. Ramsden and M. C. Letts, St. Louis, Mo.; W. T. Sapp, Lexington, Ky.; J. F. Ollinger, Salina, Kans.; J. H. Shirer, Ridgeway, Mo.; J. Carlberg, E. E. Feazel and F. B. Dickey, Kansas City, Mo.; J. G. Fulton and G. G. McVicker, Omaha, Nebr.; Carl May, South Bend, Ind.; E. J. Schreck, Dubuque, Ia.; E. M. Kerper, New Vienna, Iowa; J. M. Council, Maxton, N. C.; F. E. Wall, Alta Vista, Ia.; J. E. Ward, J. H. Quinlan, G. B. Owens, T. Burke, H. Farrar, C. A. Williams, Mr. Martin and Mr. Smith, Chicago, Ill.; W. W. Ingram, Rutland, Ill.; J. S. Joslyn, Rockford, Ill.; J. H. Patterson, Marengo, Ill.; Al Reeke, N. E. Osmond, J. P. Meehan, R. W. Kinsey and W. G. Schultz, Milwaukee, Wis.; G. B. Muma and R. L. Anderson, Canada; H. A. White, Texas; G. H. Schmidt, Florida; J. A. Rose, South Carolina; J. L. Stanley, Washington; C. S. Culp, New York; J. E. Corby, Alabama; E. W. Milburn, Ohio; F. H. Barry, Michigan; C. O. Hart, Iowa; J. R. Purnell and L. E. Rood, Indiana; I. R. Campbell and C. G. Anderson, Illinois.

Milwaukee Creditors to Meet

MILWAUKEE, WIS., Nov. 21—E. Q. Nye, referee in bankruptcy, Milwaukee, has issued notice to creditors of the defunct Milwaukee Motor Co., 32d and Burleigh streets, Milwaukee, that a meeting of creditors will be held Friday, November 28, at 10 o'clock a. m., to consider and act upon the proposition of John C. Coerper and Ernst G. Miller to the trustee of the bankrupt estate, to the effect that they will equally take up the indebtedness of the Milwaukee Motor Co., amounting to approximately $70,000; withdraw said indebtedness from participation in dividends therein, in consideration of which a release of all claims on the part of the bankrupt and its trustee against Ernst G. Miller, Harry G. John and Elsie K. John shall be delivered to them and the actions of the bankrupt against Ernst G. Miller and Elise K. Miller, now pending in the circuit court of Milwaukee county, shall be discontinued and dismissed without cost. At the same time there will be consideration of the matter of declaring a first dividend on claims filed. The plant and equipment was bid in at receiver's sale last week by the Chicago House Wrecking Co. at $86,000. The parcel of assets consisting of the accounts receivable is now being put into shape for early sale by the receiver. The company went into bankruptcy early in July, and its schedules showed liabilities of $340,459.92 and assets of $325,541.36.

Want Third Receiver for Pope Company

HARTFORD, CONN., Nov. 24—The Massachusetts interests in the Pope Mfg. Co. want a third receiver appointed. If such is the case, it will leave the Hartford interests in the minority with Massachusetts factors in control. It is said that the financial interests of the company are fairly agreed on the appointment of the third receiver, and, as they hold proxies for more than 50 per cent. of the $6,019,000 stock, their action has the support of the stockholders. It is stated that there are certain operating economies that may be instituted in the bicycle and motorcycle end of the business which will amount to 40 per cent. of the dividend on the $2,328,000 capital stock.

Standard Electric Raises Capital

JACKSON, MICH., Nov. 22—The Standard Electric Car Co., reports that it obtained new capital. In order to accomplish this it has been necessary to organize the Standard Car Mfg. Co., which will hereafter operate the business under the same management which took hold of the enterprise last spring. The company has sold 400 cars up to date.

Good Roads Bill in Congress

WASHINGTON, D. C., Nov. 22—Senator Hoke Smith, of Georgia, has introduced a very comprehensive good roads bill in Congress and it is likely to receive most careful attention from those interested in the good roads proposition. It provides in effect for national aid in the construction and maintenance of rural post roads. The first portion of the bill contemplates an appropriation of $2,000,000 to be used by the secretary of agriculture and the state road authorities, looking toward the construction of a limited number of roads in the nature of demonstration work.

The second portion of the bill is along the line of the Shackleford bill, which was passed by the House of Representatives at the last session of Congress but defeated in the Senate. Senator Smith has endeavored to modify some of the provisions of the Shackleford bill so as to meet the objections presented to it in the Senate.

The distinctive feature of the bill is the effort to turn national aid toward road improvement generally rather than the construction of a few great national highways. As the services of the secretary of agriculture will be called into use for the performance of the national responsibility in connection with this work, Senator Smith asked that the bill be referred to the Senate committee on agriculture and forestry, which was done.

Ford Building for Detroit Show

DETROIT, MICH., Nov. 24—The Detroit Automobile Dealers' Assn. has finally secured space in which to hold its annual show here. Henry Ford has come to the rescue, and the three lower floors of the Ford branch at Woodward avenue and Grand Boulevard will be used for the purpose. A very extensive addition to this large service station is now under construction, and the space mentioned will be available in time for the affair which is scheduled for January 17-24. These three floors will give a total floorspace for the show of 80,000 square feet, which amount is about 9,000 square feet more than is afforded by the Wayne Pavilion in which the show has been held previously.

Grant Buys Findlay Motor Co.

FINDLAY, O., Nov. 25—*Special Telegram*—The Findlay Motor Co., which was thrown into the hands of a receiver nearly 2 years ago, L. E. Ewing, the promoter, filing a suit in bankruptcy several weeks ago, was sold this morning to the Grant Motor Co. of Detroit, Mich., which will open the plant immediately on orders for 5,000 two-passenger roadsters to be called the Grant. The officers of the company are: President, George D. Grant, Detroit; vice-president, C. A. Grant, Detroit; vice-president, H. J. Kohler, New York; secretary and treasurer, D. A. Shaw, Detroit, and sales manager, George D. Waite, Detroit.

May Continue to Make Wahl Cars

Two Dealers and a Parts Maker Offer $28,000 for Assets

DETROIT, MICH., Nov. 25—*Special Telegram*—Following the death of George J. Wahl, creditors of the Wahl Motor Co. have been engaged in preparing the concern's property for liquidation. A creditors' committee has been appointed and the audit of the concern's books shows an indebtedness of $25,856 for materials delivered. The committee has been offered $15,000 for the property for distribution among the creditors on a *pro rata* basis, the buyers' total offer amounting to about $28,000, of which $11,500 must be paid back to dealers, who had made deposits on undelivered cars. The creditors' committee has therefore recommended the signing by all who have claims a creditors' agreement which will make the acceptance of the offer possible. In recommending the proposition the committee points out that each creditor will receive immediately about 60 cents on the dollar as against the uncertainty of bankruptcy and litigation. If the two dealers and the parts manufacturer who have made the offer secure the business, which seems likely, the making of Wahl cars will be continued, although a different and cheaper location where the overhead is less will be sought here in Detroit.

Vail Heads Maxwell Directors

DETROIT, MICH., Nov. 25—*Special Telegram*—The board of directors of the Maxwell Motor Co. is now headed by J. A. Vail, former general manager of the Fairbanks-Morse Co., at Beloit, Wis., who succeeds H. C. Bronner, of Halgarten & Co. The latter, who, as chairman of the board of directors, represented the Eastern banking interests of the Maxwell Co., has been unable to devote sufficient time to the Maxwell affairs, due to his other business interests and Mr. Vail's appointment places a head to the board, who is in a position to give the concern his undivided attention.

Miller Rubber Elects Officers

YOUNGSTOWN, O., Nov. 24—The stockholders of the Miller Rubber Co. met at the offices of the company on November 13. The same officers were elected for the ensuing year: President, Jacob Pfeiffer; vice-president, C. T. Grant; treasurer, F. B. Theiss; secretary and treasurer, W. F. Pfeiffer. They, together with J. M. Doran, comprise the board of directors. The sales for the fiscal year ending September 30, increased more than 61 per cent. over the previous year, and after paying dividends the surplus was increased to $200,000. During the year the factory floorspace and equipment in all departments were doubled.

L. P. C. Motor Co. Elects Officers

RACINE, WIS., Nov. 24—The L. P. C. Motor Co., Racine, Wis., as announced in THE AUTOMOBILE of Nov. 6, incorporated for $250,000, has elected the folowing officers: president, William Mitchell Lewis; vice-president and engineer, Rene M. Petard; secretary and sales manager, James M. Cram; treasurer, F. S. Gordon; general counsel, E. B. Hand; superintendent, O. R. Delamater, and purchasing agent, C. B. Chamberlin.

Standard Truck Co. Elects Directors

WARREN, O., Nov. 24—R. B. Wick, F. C. March and O. R. Grimmesey were elected to serve on the board of directors of the Standard Motor Truck Co. at the meeting held Thursday night. About thirty stockholders attended the meeting.

Hoosier Chauffeurs to Strike

INDIANAPOLIS, IND., Nov. 24—A general strike of teamsters and chauffeurs of commercial motor vehicles of the city is expected December 1. The teamsters and chauffeurs held a meeting yesterday afternoon and formulated their demands, which will be submitted to employers at once with a request for an answer by next Sunday. The demands include the following:

Chauffeurs: 2-ton gasoline truck $16 a week; 3-ton gasoline truck, $17 a week; 5-ton gasoline truck, $18 a week; helpers on gasoline truck to receive $15 a week and helpers on electric trucks, $13 a week. Chauffeurs on electric trucks; 2-ton, $14 a week; over 2 tons and up to 4 tons, $16 a week; 5-ton, $17 a week; 10 hours to constitute a day's work; time and one-half for overtime; no member now receiving more than the above schedule to suffer a reduction during the life of the agreement.

Equip an Extinguisher to Reduce Insurance

NEW YORK CITY, Nov. 25—At the Eastern conference of all the principal insurance companies writing automobile insurance, it was decided to allow a reduction of 15 per cent. in premiums on each car properly equipped with a 1-quart hand fire extenguisher of the pump type approved by the National Board of Fire Underwriters. This will mean a considerable reduction in the amount which the average car owner has to pay for insurance.

Cyclecar Club Formed in Detroit

DETROIT, MICH., Nov. 23—Detroit's small car enthusiasts met to the number of two score and formed the Detroit Cyclecar and Motorette Club in the parlors of the Pontchartrain, Wednesday evening, November 19. A lively discussion arose regarding a name and no conclusion was reached as regards the real definition of a cyclecar, a voiturette and a motorette. It was decided to leave the matter for decision to a meeting of the cyclecar clubs of the country to be called shortly. F. Ed. Spooner was elected president of the organization; J. P. LaVigne, LaVigne Cyclecar Co., first vice-president; J. J. Batterman, the Scripps-Booth Cyclecar Co., second vice-president; C. F. Gazeley, Detroit Commercial Axle Co., third vice-president; I. N. White, Princess Cyclecar Co., fourth vice-president; P. A. Teats, P. E. T. Cyclecar Co., secretary; R. C. Albertus, Mercury Cyclecar Co., treasurer. These officers with the following, comprise the Board of Directors: K. L. Herrmann, Herrmann Cyclecar Co., W. J. Marshall, Mercury Cyclecar Co., Ernest Weigold, Detroit Cyclecar Co., J. F. Wilkinson, Wilkinson Starter Co., S. A. Clinton, Detroit Cyclecar Co., James Scripps Booth, Scripps Booth Cyclecar Co., A. J. Farmer, Farmer Mfg. Co., Theodore F. Millington, Detroit Body Co., H. S. Baker, Hinchman and Baker and P. Heseltine, Gadabout Motor Co. A committee on constitution and by-laws was named. The organization started with nearly forty members and an active membership campaign was launched. Detroit now has over thirty-one cyclecar companies in course of actual building or organization and practically as many companies manufacturing parts in great quantities to meet the demand for home and outside consumption.

Shaffer to Make Dunham Motor

DETROIT, MICH., Nov. 30—Harry S. Shaffer, former secretary and treasurer of the Keeton Motor Co., Detroit, has retired from that company to become president of the Shaffer Motor Mfg. Co., of Alexander, Va. This company will manufacture the Dunham motor designed and patented by Herman E. Dunham, on the Pacific Coast and brought to Detroit for experimental work many months ago.

Horse Dealer Sells Automobiles

NEW YORK CITY, Nov. 21—The Fiss, Doerr & Carroll Horse Co., a leading horse dealer, has established as an adjunct to its business a weekly sale of automobiles and commercial vehicles. The automobiles consigned to this company will be sold at auction at 3 p. m. Thursday of each week, and the highest bidder will secure the cars. There will be a charge of 5 per cent. on all cars selling over $100 and $5 a car on sales less than $100. A special sales ring has been constructed to carry on this line of work and every facility installed.

Receiver for Disco Starter

DETROIT, MICH., Nov. 24—The Disco Co., maker of electric cranking and lighting equipment and acetylene starting apparatus for automobiles, has been placed in the hands of a receiver, the Security Trust Co., being appointed in that capacity. An appraisal of the property is being made at the present time.

NEW ORLEANS, LA., Nov. 21—Governor Luther E. Hall of Louisiana has sent a communication to the general conference of Interstate Commissions to be held in New York November 21, stating that Louisiana will be willing to co-operate with other states in the adoption of uniform motor vehicle legislation.

Big Races at Santa Monica

Vanderbilt and Grand Prize To Be Run Over Los Angeles Course Next February

LOS ANGELES, CAL., Nov. 25—According to Leon T. Schepler, chairman of the Western Racing Association, the Grand Prize and Vanderbilt Cup road races will be run on the Santa Monica course February 22 and 24, the Vanderbilt on the former date. The bringing of these races to Los Angeles has been due to the work of Finley R. Porter of the Mercer company, Trenton, N. J., who, since the abandonment of these races by the Savannah people some months ago, has been working at the request of the Motor Cups Holding Assn., New York, to have these events held at some other place.

According to the tentative agreement between the Western Racing Assn. and Mr. Porter, representing the Motor Cups Holding Assn., the Vanderbilt Cup Race will be for cars of 600 cubic inches and under, and with a course approximately 300 miles. The Grand Prize will, as heretofore, be a free-for-all, but with the distance the same as the Vanderbilt. In both events there will be nominal entry fees of approximately $250. The prizes will be $8,000 in each race divided as follows: $5,000 first; $2,000 second and $1,000 third.

Florio Wins Madonie Cup

PARIS, FRANCE, Nov. 14—With his gasoline allowance limited to 4.4 gallons, and a distance of 93 miles of mountain roads to be covered, Chevalier Vincenzo Florio has won the Madonie cup for the third year in succession, the trophy thus becoming his permanent property. The race started from outside Palermo, and the course lay over some of the most hilly and winding roads in the Island of Sicily. Vincenzo Florio, who drove a four-cylinder Aquila-Italiana car, finished the course in 3 hours 17 minutes. He was followed home by a second Aquila-Italiana in 3 hours 21 minutes 27 seconds, and by a third machine of the same make and horsepower 16 seconds later. The winner's average speed was 28.3 miles an hour. Only three other cars were able to go the distance on the fuel allowance. These were all three Fords, their time varying from 3 hours 33 minutes to 4 hours 10 minutes. Vincenzo Florio is a rich amateur motorist and promoter of the annual Targa Florio race round Sicily.

Regulations for Tour de France

PARIS, FRANCE, Nov. 15—Regulations for the Tour de France, to be held from March 1 to 25, indicate a run of about 3,800 miles in thirteen distinct stages and on alternate days. On the open road the cars will be called upon to maintain an average speed of 19 miles an hour, all stops included, and to cover the full distance without the change of any essential part; practically everything on the car will be sealed to prevent changes. The daily runs will be alternated by a day spent in twelve different towns during which there will be short distance speed contests and hill climbs without any change being made in the gearing or the equipment of the car. On these alternate days it will be forbidden to do any work on the cars other than filling tanks. In all probability the tour will close with a 60-mile speed contest on the open road. This year's Tour de France is open to machines having a cylinder area of not more than 3 liters, machines of this type being those most commonly employed for touring purposes. With a view to equality in the speed contest, the competitors will be subdivided into six different classes varying in cylinder area from 1 to 3 liters. This event promises to be the most important touring competition of the year and will doubtless receive good support from the trade. On the day the lists were opened two Buicks, a team of three Barre cars and one S. C. A. P. were entered.

Boillot Wins Novel Contest

PARIS, FRANCE, Nov. 14—With the motor stopped, driver and his pasenger standing by the side of the car, it was necessary to crank on the order being given, jump into the seats, travel 546 yards down a straight road, turn round without letting the wheels mount on the sidewalk, and pull up dead on the starting line. This novel form of competition, organized in the suburbs of Paris, was intended to prove the skill of drivers, the easy starting of motors, the degree of pick-up, the ease of turning, and the effectiveness of the brakes. Georges Boillot and his grand prix Peugeot racer proved to be the best combination of man and machine. When the order came, Boillot cranked his 150 horsepower racer with a quarter pull, vaulted over his steering wheel, and was racing down the road while his mechanic was settling into his seat. The turn was made by violently skidding the car until it spun round as if on a pivot. Boillot kept up his speed until the end of the return run, and when on the finishing line put on his brakes with such effect that the car spun completely round without however getting away from the line. The distance of 1,093 yards with standing start, a turn in a 15-foot road and a standing finish, had been covered in 1:28:3-5. Second prize went to an amateur driver, on a 3-liter Peugeot racer. It was just 2 seconds slower than the big racer. A Ford, finished fourth, pulling up on the brakes in a normal manner, without spinning round as was done by most of the drivers.

Penalization for Faulty Equipment

NEW YORK CITY, Nov. 24—In the coming New York reliability run of the Motor Dealers' Contest Assn., which will cover 500 miles in 3 days, December 3, 4 and 5, penalties for mishaps to accessories will be given for the first time in the history of contests in this country. There will be about thirty entries.

The following list gives the penalties and in addition to this there is a ten point penalty for every blowout that occurs in the course of the run, with the provision that the casing so blown out shall be delivered to the technical committee at the end of the day's run. There is no penalty for punctures. Besides these penalties there are the regulation sort for mechanical troubles. Also where a car uses a motor starter of any sort this will be liable to penalty too. On checking out 2 minutes will be allowed for the starter to get the car going. Failure to get going in this time limit will bring a penalty of one point for each minute of delay. Where there is a starting crank fitted it may not be used until the 2-minute period is up, and then there will be a penalty of one point a minute for each man working to start the car.

PENALTIES TO BE IMPOSED FOR VIOLATIONS OF RULES IN NEW YORK DEALERS' 500-MILE RUN

	Points
Windshield	
Broken or cracked glass	5
Broken frame or rod	3
Broken or lost support	3
Bent frame or rods	2
Loose bolts or screws, each	1
Lost bolts or screws, each	2
Imperfect operating shield	3
Loose glass	2
Lamps	
Loose lamps, each	1
Broken glass, each	1
Failure to properly illumine, each	3
Broken or damaged body	2
Lost fount, or broken or lost bulb	5
Loose bracket, each rivet or bolt	1
Broken bracket	5
Entrant must state at start of contest, if car is equipped with combination lighting, which system is to be used.	
Speedometers	
Inoperative speedometers, failure to register within 25 per cent. accuracy	10
Entirely inoperative	25
Loose, each screw and nut	1
Horns	
Inoperative horn, each	5
Lost horn	5
Loose horn, each screw or nut	1
Tire Rack	
Broken metal parts	5
Loose parts, each screw and nut	1
Shock Absorbers	
Broken, each	5
Loose, each	2
Broken rebound strap, each	2
Bumpers	
Broken	5
Loose, each screw or nut	1
Tops	
Broken bow	5
Broken holding straps	2
Broken bow holders	2
Battery	
Where battery for starting and lighting, or either separately, is inoperative, or discharged so as not to satisfactorily serve duty	25
Replacing battery during contest, where charging generator is equipment	25
Replacing battery during contest, where no charging means furnished at other times	3
In final examination, penalty for discharged battery, if no charging means provided	0
Gas Lighting	
Inoperative gas tank	25
Inoperative acetylene generator	25
Generator—Electric	
Inoperative battery, charging generator or dynamo	25
Starter	
Inoperative starter	25
Bodies	
Defective door	2
Broken or loose floor boards, each	1
Broken fender iron	6
Broken fender	5
Loose fender	2
Broken running board bracket	6
Loose running board	2

To Have Cyclecar Race

Columbus Club Arranges for 2-Day Meet To Be Held Early in the Spring of Next Year

COLUMBUS, O., Nov. 25—The Columbus Automobile Club is promoting a cyclecar race to be held in the spring on the track of the Columbus Driving park, which is known as the fastest dirt track in the country. The date for the meeting, which will consist of 2 days' racing will be fixed later, and will take into consideration the wishes of the manufacturers of cyclecars both in the United States and foreign countries.

It is planned to have a number of races ranging from 5 to 25 or 50 miles in length. Classes will be arranged for the various cars entered and in that way a 4-horsepower car will not compete against a 10 or 12-horsepower car.

Judging from the number of inquiries received the race will be well patronized by manufacturers. The announcement is made that in the United States there are forty-eight concerns, either organized or being organizd to build cyclecars.

The arrangements for the meeting are under the charge of the contest board of the club of which L. M. Browne is chairman.

Patterson Enters Three for Indianapolis

NEW YORK CITY, Nov. 24—E. C. Patterson, the noted Chicago sportsman, who last year backed a Mercedes with Theodore Pilette at the wheel, to a fifth in the Indianapolis five-hundred-mile race, plans next year to send a three-cornered team of Europe's best after the prize. Pilette, Salzer, and Lautenschlager, in the cars with which they finished, third, fourth, and sixth, respectively, in the Grand Prix of Le Mans, trailing only the DeLage entries, are his choice.

Goux and Boillot Coming to United States

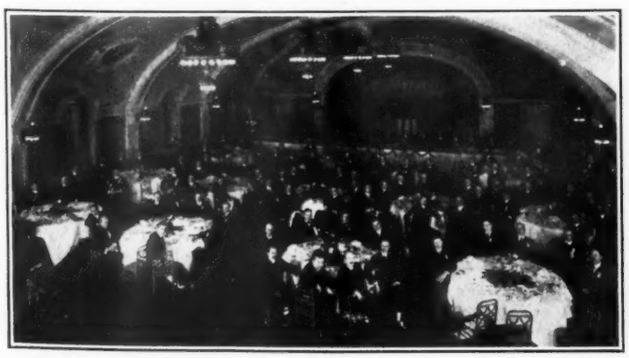
NEW YORK CITY, Nov. 24—Jules Goux and Georges Boillot, of the Peugeot racing camp, are soon to visit the United States in order to renew acquaintances and to get a line on the 1914 American racing season, it is reported. Johnny Aitken, of the National factory, who served as Goux's pit man and directed the latter's race during the Hoosier five-century classic, is authority for the statement. The Frenchmen expect to stay a couple of weeks at least.

Racing Club for San Antonio

SAN ANTONIO, TEXAS, Nov. 21—The San Antonio Automobile Racing Club has been organized here with a capital stock of $8,000. It will build a track and will have for its purpose the encouragement of automobile racing. The directors are W. A. Herring, Emil Frank, H. G. Staacke, John B. Carrington and Dr. Frederick Fielding.

Two S. A. E. Divisions Meet

NEW YORK CITY, Nov. 25—This morning the Motor Testing Division of the Society of Automobile Engineers met in the rooms of the Society to consider its second report. It is endeavoring this time to evolve two forms of test, one for commercial and the other for scientific work. John O. Heinze is chairman; others who were present are: Henry Souther and Prof. J. A. Moyer, of Pennsylvania State College. In the afternoon the Electric Equipment Division met to take up the matter of standards for the electric equipment of gasoline cars, whether one or two-wire systems should be used, details of installations, size and capacities of batteries, etc. A. L. Riker is chairman. There were present members from the Committee on Electric Equipment of Garages of the National Fire Protection Assn., as well as from a similar committee of the Electrical Vehicle Association of America. Members of the Standards Committee of the American Institute of Electrical Engineers were also invited. A large attendance is expected.



View of the banquet hall at the big Lozier convention

Motor Truck Club Holds Meeting

NEW YORK CITY, Nov. 21—A meeting of the Motor Truck Club at the Hotel Cumberland on Wednesday evening brought out the fact that the adaptation of motor trucks to the delivery of coal is largely influenced by two considerations: the availability of loading and unloading facilities for motor trucks and the tremendous difference between delivery demands in the summer and winter seasons, differences which call for a very elastic equipment, economically changed. It appeared also that the driver is the largest factor in this question, the efficient driver being so rare and valuable as to make it impracticable to lay him off in the dull months and probably lose him. By coal trucks it was shown that as high as 15 cents a ton saving in handling cost had been accomplished by motor trucks.

N. Y. A. A. Elects Officers

TROY, N. Y., Nov. 20—The following officers were elected here today at the convention of the New York State Automobile Assn. held in this city. President, A. J. Deer; first vice-president, F. M. Baucus; second vice-president, J. M. Ross and secretary, R. S. Ross. The convention went on record as approving the employment of convicts on state road work.

Nebraska A. A. Elects Officers

GRAND ISLAND, NEB., Nov. 19—The third annual meeting of the Nebraska State Automobile Assn. closed tonight with the election of the following officers: President, Harry Lawrie, Omaha; vice-president, B. A. George, Lincoln; second vice-president, T. F. Patterson, North Platte; secretary, A. H. Overgard, Fremont; treasurer, John Shieck, Beatrice. Omaha was chosen as the place for the next annual convention.

Lozier Convention a Success

DETOIT, MICH., Nov. 22—Two hundred representatives of the Lozier M. C. Co., attended the dealers' convention. They were impressed with the many educational features brought out at the meeting. One of the hits of the convention was the model sale staged by three Lozier salesman, illustrating the proper method of approaching a prospect who visits the salesroom. Banquets at the Pontchartrain and Griswold Hotels, and a theater party were included in the entertainment program.

New York Trade Assn. Organizes

ALBANY, N. Y., Nov. 20—With an enrollment of over 200 automobile dealers in New York, Albany, Rochester, Syracuse and Buffalo, the Automobile Trade Assn. of New York organized here today. These dealers have pledged to assist in the defeat of legislation detrimental to the automobile industry.

The association has for its object the furtherance of good roads construction, the encouragement of the automobile trade and the enactment and maintenance of uniform, consistent and beneficial laws in the state relating to the use of automobiles. Charles T. Terry was one of the leading spirits in the organization of the association.

Bosch Did Not Sue Hendee

In THE AUTOMOBILE for November 6, appeared a heading to the effect that the Bosch Magneto Co. had sued the Hendee Mfg. Co. for infringement of the Honold patent, 974,967, which covers magneto ignition for two-cylinder V-type gas engines. This heading was a misstatement as the Bosch company had simply served notice on the Hendee company to desist from infringement.

HARTFORD, WIS.—Harassed by a series of thefts of materials and finished parts, the Kissel Motor Car Co., of Hartford, Wis., has thrown a guard of Pinkerton detectives around its big works and issued a public warning to employees and others.

Factory Miscellany

KNIGHT Tire Doubles Plant—The Knight Tire & Rubber Co., Canton, O., is enlarging its plant to double production and force of employees. New buildings will be completed February 1 and will include three departments at an estimated cost of $110,000. The new laboratory has just been completed. The production will be increased to total 500 tires and from 700 to 1,000 tubes per day, according to Secretary W. S. Cunningham.

Factory for St. Charles—An automobile plant may locate in St. Charles, Mo., which will require 10 acres and will employ 350 men the first year.

Chase May Build—The Chase Motor Truck Co., Syracuse, N. Y., is contemplating the erection of a $150,000 factory for the manufacture of tractor plows.

Covert Builds Addition—The Covert Motor Vehicle Co., Lockport, N. Y., is erecting an addition to its plant on Grand street. The company manufactures automobile parts.

New Plant for East Rochester—The Automobile Sundries Co. has leased the third floor of the Eyer Block, where it is installing machinery, expecting to start manufacturing December 1.

Leases Factory Space—A deal has been completed in Xenia, O., for leasing the lower floor of the Eagles' building on West Main street by the Xenia Rubber Manufacturing Co. and the Auto Service Co.

Continental Plant Busy—The Continental Motor Mfg. Co., Muskegon, Mich. is busy on an order for 10,000 motors from the Hudson Motor Car Co., Detroit, In the near future 750 men will be employed.

Dayton-Dick's New Plant—The Dayton-Dick Co., Quincy, Ill., maker of electric generators, ignition systems and starters, is moving into a new factory of 80,000 square feet floorspace. The latest design of machinery is used in equipping all departments.

Fire Destroys St. Louis Plant—Fire recently destroyed the plant of the Powitsky & Collins, St. Louis, Mo., manufacturers of carriages and automobile bodies. The damage, according to President Frank H. Powitsky, is $270,000, fully covered by insurance.

Cadillac Breaks Records—The Cadillac Motor Car Co., Detroit, Mich., manufactured and shipped 2,016 cars during the month of October. Of this number, 1,828 were touring types, while 198 were of the closed variety. The retail selling value of these cars was $4,246,425.

Eisemann Moves to Factory—The Eisemann Magneto Co. has moved its sales and general offices to the Bush Terminal Bldg., Brooklyn, N. Y., in which its factory is located. The company will maintain a service station at 225 West Fifty-seventh street, New York City.

Fulton Forge Adds—The Fulton Drop Forge Co., of Canal Fulton, O., is erecting a large addition to its plant to take care of the increased volume of business. The addition will be located along the tracks of the B. & O. Railway Co. A. L. Eicher is the new general manager.

Completing Pattern Shop—The Racine Foundry Co., Racine, Wis., a large producer of cylinder castings and other motor car parts, is completing a large new pattern shop which will facilitate the greatly increased output made possible by the enlargement of the foundry proper during the past few months.

Fulton to Milwaukee—The Fulton Co., maker of the Aermore Exhaust Horn, has moved from Marshalltown, Ia., to its new plant at 726 National avenue, Milwaukee, Wis. The change involves a material enlargement of the company's capacity together with incorporation in Wisconsin with a capital of $25,000.

Rowe Buys Land—The Rowe Motor Co., which was located in Coatesville, Pa., has bought 12 acres of land in Downingtown, Pa., including a brick yard building, which is being prepared for occupancy. The company manufactures motor trucks, which have met with such a wide market that the expansion was necessary.

Racine Plant Destroyed—The plant of the Racine Metal Stamping Co., Racine, Wis., which furnishes stampings to the motor car and other industries of Racine, was destroyed by fire and explosion, causing a loss of $25,000. The building was totally wrecked. The principal loss was on machinery, equipment, patterns, dies, etc. A new fireproof factory will be erected at once. A. Falkenrath and Jerome Ritter are the principal stockholders.

Duck Plants Enlarging—The making of automobile tire duck has become to be a large industry in Eastern Connecticut. Besides the Williamsville Mfg. Co., now the property of the Goodyear Tire & Rubber Co., and in process of enlargement, three other mills in Putnam and Danielson are engaged in making this class of goods, the rush of orders necessitating overtime work in some departments. The Williamsville plant will shortly be operated overtime in all departments.

Gibson Buys Plant—The Gibson Motor Car Co., with offices in the Oliver Building, Pittsburgh, has concluded negotiations for the purchase of the buildings of the Pittsburgh Tube and Steel Co., at Monaca, and is having the plant remodeled for the manufacture of automobiles. The main building of the works is 150 x 200 feet and the equipment includes a gas-engine-driven power plant of 75 horsepower. Machine tools and equipment is being purchased with the expectation of putting the plant in operation during the present month. The company is capitalized at $1,000,000 with Dr. E. C. Gibson, of Rochester; H. C. Fry, Jr., of Pittsburgh, and James Mahoney, of Rochester, as incorporators.

The Automobile Calendar

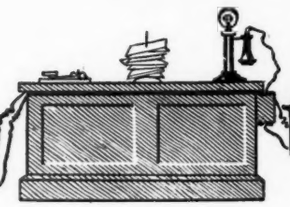
Shows, Conventions, Etc.

Dec. 6-13	Toledo, O., Annual Show, Factories Bldg., Toledo Auto Shows Co.
Dec. 9-13	Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20	New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.
Jan. 2-10	New York City, Importers' Automobile Show, Hotel Astor.
Jan. 3-10	New York City, Automobile Show, Grand Central Palace.
Jan 10-16	Milwaukee, Wis., Sixth Annual Show, Auditorium, Milwaukee Automobile Dealers' Assn.
Jan. 10-17	Cleveland, O., Automobile Show, Wigmore Coliseum, Cleveland Automobile Show Co.
Jan. 10-17	Philadelphia, Pa., Show, Metropolitan Building, Automobile Trade Assn., H. W. Terry, Secretary.
Jan. 12-17	Bridgeport, Conn., Annual Automobile Show, State Armory, B. B. Steiber, manager.
Jan. 17-24	Pittsburgh, Pa., Annual Automobile Show, Automobile Dealers' Assn.
Jan. 24-31	Montreal, Que., Automobile Show, Passenger Cars, Montreal Automobile Trade Assn.
Jan. 24-31	Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 26-31, 1914	Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.
Jan. 31-Feb. 7	Minneapolis, Minn., Automobile Show.
Feb.	Hartford, Conn., Show.
Feb.	St. Louis, Mo., Show.
Feb. 2-7	Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Assn.
Feb. 3-7	Montreal, Que., Motor Truck Show, Montreal Automobile Trade Assn.
Feb. 7-12	Seattle, Wash., Annual Automobile Show, State Armory Bldg., W. I. Fitzgerald, Manager.
Feb. 9-14	Grand Rapids, Mich., Fifth Annual Western Michigan Show, Klingman Furniture Exposition Bldg., *Grand Rapids Herald*.
Feb. 9-14	Buffalo, N. Y., Truck Show, Buffalo Automobile Dealers' Assn.
Feb. 16-21	Kansas City, Mo., Auto Show.
Feb. 21-28	Newark, N. J. Automobile Show, N. J., Auto Trade Assn.
Feb. 21-28	Cincinnati, O., Automobile Show, Cincinnati Automobile Dealers' Assn.
Feb. 23-28	Omaha, Neb., Automobile Show, Omaha Automobile Assn.
Mar. 2-4	Cincinnati, O., Commercial Vehicle Show, Cincinnati Automobile Dealers' Assn.
Mar. 2-6	Fort Dodge, Ia., Show, Fort Dodge Auto Dealers' Assn.
Mar. 7-14	Boston, Mass., Automobile Show.
Mar. 9-14	Des Moines, Ia., Show, Des Moines Automobile Dealers' Assn.
March 17-21	Boston, Mass., Truck Show.

Race Meets, Runs, Hill Climbs, Etc.

Dec. 3-5	New York City, 500-mile Reliability Run, Motor Dealers' Contest Assn.
May 30	Indianapolis, Ind., 500-mile Race, Speedway.

The Week in the Industry



Motor Men in New Roles

CRAM Lewis Sales Manager—J. M. Cram, formerly manager of the Mitchell M. C. Co., New York City, which is the New York branch of the Mitchell-Lewis Motor Co., has joined William Mitchell Lewis, in the latter's L. P. C. Motor Co., Racine, Wis. He will be general sales manager of the company.

Lozier Returns from Europe—H. A. Lozier has returned to Detroit, Mich., from a short trip to Europe.

Jencks Locomobile Manager—H. E. Jencks has been appointed manager of the Locomobile branch, Washington, D. C.

Green J. I Case Manager—C. R. Green is the new manager of the Louisville, Ky., branch of the J. I. Case Threshing Machine Co. He succeeds Charles King.

Clayton Resigns—R. R. Clayton has resigned his position with the engineering department of the Atlantic Vehicle Co., of Newark, N. J. His future plans have not yet been formulated.

Evans Resigns Club Presidency—Powell Evans, for more than four years president of the Automobile Club of Philadelphia, Pa., has resigned. Vice-President Stedman Bent succeeds him.

Kiefer Off for Europe—J. H. Kiefer in the future will represent the interests of the Delco starting and lighting systems in Germany, for which country he sailed from New York City on Saturday, the 15th inst.

Beam Lefever Sales Manager—R. M. Beam, formerly connected with C. L. Barnes & Co., Detroit, Mich., Chicago and Cleveland, has gone with the Lefever Arms Co., Syracuse, N. Y. He becomes sales manager.

Hallowell Joins Hearst Forces—Montgomery Hallowell, former advertising manager of the U. S. Motor Co., has joined the advertising forces of W. R. Hearst. He will be located in Boston for the time being.

Cassidy J-M Sales Manager—E. A. Cassidy, formerly a member of Petry-Cassidy, of Philadelphia, Pa., has become sales manager of the automobile accessories department of the H. W. Johns-Manville Co., New York City.

Flaherty Sales Manager—L. C. Flaherty has resigned from the C. A. Shaler Co. to take up the position as sales manager for the Adamson Mfg. Co., of East Palestine, O., manufacturer of vulcanizers and other automobile specialties.

Bill Hayes Factory Manager—H. L. Bill has been appointed factory manager of the Hayes Mfg. Co., Detroit, Mich., and previous to that was with the Chalmers and Metzger companies, the Standard Roller Bearing Co., and the Tudhope M. C. Co., of Orillia, Ont.

McDermid Sales Manager of Falcon—W. A. McDermid, who for the past two years has been sales and advertising manager of the Service Recorder Co., Cleveland, O., has resigned to join the new Falcon Cyclecar Co., of the same city. He will occupy the same position he held with the Service Recorder Co.

Leisure Advanced—The Studebaker Corp., South Bend, Ind., has announced that on January 1, 1914, Albert Leisure will be advanced from manager of the company's delivery wagon department to manager of the motor and horse-drawn vehicle department, in the Northwest. His territory will include the states of Montana, Washington, Idaho and Oregon.

Goodwin Woods Electric Sales Manager—Several changes in the executive staff of the Woods Motor Vehicle Co., Chicago, Ill., have taken place. H. L. Goodwin becomes general sales director, with headquarters at the general offices in Chicago. W. A. Simonson is now general sales manager in charge of the distribution of agencies throughout the U. S. R. L. Moffett remains advertising manager of the company.

Skinner Heads N. Y. Mitchell—C. P. Skinner has been appointed manager of the Mitchell New York City branch. He has been associated with the Mitchell since 1905, when he formed a company to take the New York agency. Two years ago the factory bought out this agency and made it a branch. Since then he has been in charge of the Mitchell interests in Philadelphia. G. A. Skinner, a brother, succeeds W. W. Burke as sales manager of the Mitchell company in New York City. His territory covers eleven Eastern States.

Garage and Dealers' Field

Federal's New Building—The Federal Truck Co. has leased a four-story building in the downtown district, St. Louis, Mo., until recently occupied by the Maxwell people.

Lee Tire Moves—The Lee Tire & Rubber Co., of Conshohocken, Pa., manufacturer of Lee tires, will remove to its new building in Chicago, Ill. The two-story building at 2031 Michigan avenue has been leased. G. H. Wright will be in charge.

Jandorf Vacates U. S. Motor Building—L. C. Jandorf, New York's large second-hand dealer, has decided on a grand clearing sale, after which he will remove from the old U. S. Motors Building and restart in the second-hand business in a moderate way, and try to keep it within bounds.

Allen Auto Specialty Moves—The Allen Auto Specialty Co., manufacturer of tire cases and gauges, has removed its Chicago, Ill., salesroom from 1436 to 1627 Michigan avenue. H. K. Allen is the branch manager. A new manufacturing branch will soon be opened at San Francisco, Cal., to take care of the increasing demand on the Pacific Coast.

New Lincoln Highway Pennant—A pennant of the Lincoln Highway is being issued to automobile owners who are contributors to the fund at the national headquarters in Detroit Mich. This pennant is 14 by 36 inches and is in four colors. They are distributed in pairs, rights and lefts, so they may be placed on both sides of the car.

Garage Makes Monthly Inspection—The Vaught Inspection and Service Bureau has opened quarters in St. Louis, Mo., and will serve automobile owners by making a monthly inspection and overhauling. The bureau contracts to report in detail on the running gear, tires and wheels, etc. The company is located at 4374 Olive street.

New Company Formed—The Henderson Motor Car Co. has just been incorporated in Boston, Mass., to handle the Henderson line with James A. Binney as president and Porter B. Chase as sales manager. Mr. Binney has handled the Henderson in Boston for some time. He has moved from Boylston street to a new building at 62 Brookline avenue near the American League baseball park.

Republic's N. Y. Selling Connection—In line with its policy of establishing direct selling connections, the Republic Rubber Co., Youngstown, O., has acquired control of the Republic Rubber Co., of New York City, formerly owned and managed by New York people. The same location will be retained. Mr. C. W. Hardin has been elected vice-president and treasurer of the new organization.

Sells Second-Tires—The Auto Tire Brokerage Co., Louisville, Ky., has been organized to buy and sell automobile tires the appearance of which was affected while in the course of making. A. L. McCormick is president of the new company, W. J. Welch, vice-president, and C. L. Holden, secretary and treasurer. The salesroom and offices of the concern are located at 935 Third avenue.

Three-Cornered Move in St. Louis—Three of St. Louis (Mo.'s) most important automobile dealers have arranged for a three-cornered move. The Hudson-Phillips Co. will move from its quarters on North Grand avenue to its new location on Locust street. As soon as the Hudson Co. vacated its premises the Oldsmobile Co. of Missouri moved into the quarters on Grand avenue. The Buick Motor Co. branch, now at Twelfth and Locust streets, will move into the old Oldsmobile quarters on West Locust street.

Goodrich's New Service Station—The new service station devoted to motor truck tires will be occupied by the B. F. Goodrich Co. very shortly. This is situated at 1780 Broadway, New York City. Over 20,000 square feet of floor space is used for garage, shop and stock carrying purposes and every appliance will be installed. To reduce to a minimum the time consumed in handling wheels, the shop has been located on the ground floor, which makes it possible to place trucks in close proximity to where the work is being done.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BUFFALO, N. Y.—Clemens Motor Sales Co.; capital, $50,000; to sell automobiles. Incorporators: J. G. Lesswing, R. B. Metro.

BUFFALO, N. Y.—Motor Carette Co.; capital, $30,000; to make automobiles. Incorporators: H. J. Carrigan, C. J. Kern, A. M. Pearsall.

CHICAGO, ILL.—Bryn Mawr Auto Co.; capital, $2,500. Incorporators: F. C. Rathje, Guy Van Schaik, Adolph Wesemann.

CHICAGO, ILL.—Chicago Grant Motor Sales Co.; capital, $5,000; to sell automobiles. Incorporators: C. C. Mowbray, E. H. Abbot, E. G. Fassett.

CHICAGO, ILL.—Chicago Great Western M. C. Co.; capital, $15,000; to deal in automobiles. Incorporators: S. Darmstadter, M. Darmstadter, A. J. Schuett.

CINCINNATI, O.—Franklin M. C. Co.; capital, $20,000; to deal in automobiles. Incorporators: Newman Samuel and others.

CLEVELAND, O.—F. J. Allen Co.; capital, $5,000. F. J. Allen, C. J. Aaron, R. M Schroll, M. F. McFadden, W. M. Byrnes.

CONCORD, N. C.—Cabarrus Motor Co.; capital, $10,000. Incorporators: P. M. Lafferty, J. C. and E. A. McCanless.

CRAWFORDSVILLE, IND.—American Motor Wheel Co.; capital, $600,000;manufacture trucks and motors. Incorporators: W. H. Owen, C. S. Rowland, J. V. Wilson.

DETROIT, MICH.—American Motor Truck Co.; capital, $10,000; to manufacture automobile trucks. Incorporators: A. H. Reinhold, William K. Ackerman.

EAST ROCHESTER, N. Y.—Housel Mfg. Co.; capital, $25,000; to make automobiles. Incorporators: W. H. Cole, W. E. Housel, Bernice B. House.

MARION, O.—Stoebe-Nelson Co.; capital, $3,000; to deal in automobiles. Incorporators: Joseph C. Stoebe, E. C. Nelson, Wade Mossman.

MINNEAPOLIS, MINN.—Flyer Motor Car Co.; capital, $100,000; to build cyclecars. Incorporators: H. C. Campbell, G. C. Milne, Thomas Howard, A. A. Gloetzner.

NEW YORK, N. Y.—Auto Pad Co.; capital, $1,000,000; make automobiles, trucks and boats. Incorporators: J. F. Curtain, C. E. Eaton.

NEW YORK, N. Y.—Merchants Motors Sales Co.; capital, $120,000; general auto business. Incorporators: B. Cukor, W. Radohitz, C. J. Quinn.

NEW YORK, N. Y.—Paige-Detroit Co.; capital, $50,000; to manufacture motors. Incorporators: E. M. Dalley, S. J. Wise, F. W. Kolb.

NEW YORK, N. Y.—The G. Piel Co.; capital, $50,000; to make motors. Incorporators: G. Piel, C. S. Pinkney, H. J. Robinson.

WATERLOO, IA.—Burd Auto & Supply Co.; capital, $15,000; general automobile business. Incorporators: C. A. Burd, A. F. Burd, A. E. Burd.

GARAGES AND ACCESSORIES

BOSTON, MASS.—Parker Carbureter Co.; capital, $250,000; carbureters. Incorporators: G. E. Parker, K. E. Parker, J. T. Clark.

BUFFALO, N. Y.—Meyer Motor Car Co.; capital, $50,000; repair work. Incorporators: A. W. Meyer, G. H. Meyer, F. D. L. Stowe.

CHICAGO, ILL.—Motor Devices Co.; capital, $3,000; to deal in accessories. Incorporators: G. M. Shontz, G. A. Kelly, R. D. Donovan.

CINCINNATI, O.—Warner Auto Top Co.; capital, $40,000; to manu acture automobile tops. Incorporators: W. W. Warner and others.

CLEVELAND, O.—Quick Action Spring Co.; capital, $15,000; spring repairing and general automobile business. Incorporators: Henry Wavre, G. H. Murchison, L. T. Jones. S. L. Levy. Fred Sumpft, E. J. Thomas, Fred LaVigne.

COLUMBUS, O.—Franklin Motor Car Co.; capital, $20,000; garage. Incorporators: Samuel Newman, R. C. Anderson, F. H. Aufderbecke, J. C. Lueders, J. F. Koch.

DALLAS, TEX.—Stafford Automobile Lamp & Number Co.; capital, $60,000; combination lamp and number. Incorporators: F. H. Pollard, William Doran, M. M. Parks.

DAYTON, O.—B. B. L. Co.; capital, $10,000; to deal in accessories. Incorporators: T. H. Barlow, C. F. Budroe, E. M. Lewis, B. E. Budroe, G. T. Rooney.

DETROIT, MICH.—Headlight Support Co.; capital, $50,000; to make accessories. Incorporators: A. A. Caille, C. R. Chisholm.

DULUTH, MINN.—Resilient Auto Wheels Co.; capital, $50,000; make automobile wheels. Incorporators: Arthur Jutila, Helmer Johnson, Osmond Thompson, A. W. Younkvist, B. E. Wellberg.

EAST LIVERPOOL, O.—Morgan & Marshall Rubber & Tire Co.; capital, $500,000; tires.

FLORENCE, N. C.—Covington Co.; capital, $15,000. Incorporators: B. W. Covington, C. E. Commander, F. J. Brand.

INDIANAPOLIS, IND.—Central Prest-O-Ceal Co.; capital, $50,000; to make a tire compound. Incorporators: F. K. Gardner, G. C. Grimes.

NEW YORK, N. Y.—Golde Patent Mfg. Co.; capital, $200,000; to make auto supplies. Incorporators: Hannah L. Geller, B. C. McKenna, N. M. Kaplan.

NEW YORK, N. Y.—N. W. Mfg. Co.; capital, $25,000; soap for automobiles. Incorporators: C. E. Williamson, C. E. Smith, L. C. Wallace.

NEW YORK, N. Y.—Patent Rubber Co.; capital, $50,000; to manufacture tires. W. N. Croxton, J. G. Metz, C. L. Brookheim.

NEW YORK, N. Y.—United Auto Rim Co.; capital, $50,000; to make rims. Incorporators: C. W. Schildwachter, A. Linden, P. S. Smith.

OWENSBORO, KY.—Central Motors Co.; capital, $1,000; general garage business. Incorporators: Elmer Little, B. J. and W. C. Cavin.

PHILADELPHIA, PA.—F. H. Scott Co.; capital, $100,000; to manufacture electrical apparatus. Incorporators: F. H. Scott, C. B. Lorimer, N. Mills.

SAN ANTONIO, TEX.—San Antonio Automobile Racing Club; capital, $8,000; to promote automobile racing. Incorporators: Emil Frank, H. H. Stackle, J. B. Carlington.

ST. LOUIS, MO.—Pneumatic Devices; capital, $50,000; to make pneumatic devices. Incorporators: H. B. Graham, J. E. Bishop.

ST. LOUIS, MO.—Three Kays Co.; capital, $2,000; to manufacture carbon cleaning compounds. Incorporators: Rosie Olin, Edw. Mendelsohn.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Ackley, Ia.	Marathon	J. R. Croot.
Ada, O.	Marathon	Buckeye Auto Sales Co.
Aguadilla, P. R.	Cole	Sanders, Phillippi & Co.
Akron, O.	Marathon	Roeger Bros.
Allerton, Ia.	Oakland	B. & Mc. Auto Co.
Ames, Ia.	Oakland	O'Brien Motor Co.
Antigo, Wis.	Cole	Reed & Duval.
Aurora, Ill.	Cole	T. S. Simpson.
Bangor, Me.	Franklin	Edwin O. Hall.
Boston, Mass.	Marathon	Marathon Auto Co. of Boston.
Brook, Ind.	Marathon	W. A. Gridley.
Brookville, O.	Marathon	F. A. Whisler & Son.
Buffalo, N. Y.	Marathon	G. H. Poppenburg.
Burlington, N. C.	Marathon	Burlington Motor Car Co.
Camden, Ind.	Marathon	Asa Cline.
Chapman Quarries, Pa.	Marathon	Roberts Motor Car Co.
Chicago, Ill.	Marathon	Marathon Motor Co.
Chicago, Ill.	Marathon	W. C. S. Motor Co.
Clarence, Ia.	Marathon	H. D. Kenneman & Son.
Cleveland, O.	Marathon	Goss Auto Supply Co.
Collins, Ia.	Oakland	Korte & Korte.
Columbus, O.	Marathon	Pausch-Selbach Wagon & Auto Co.
Cressona, Pa.	Marathon	Bittle & Reber.
Dallas, Tex.	Marathon	Tri State Sales Co.
Danville, Va.	Oakland	Z. V. Johnson.
Dayton, O.	Marathon	C. W. Long.
Des Moines, Ia.	Marathon	Means Auto Co.
Dolores, Col.	Marathon	H. C. Wallace.
Dyersville, Ia.	Marathon	Andrew J. Mormon.
Eagle Grove, Ia.	Marathon	Wm. Pletcher.
Elgin, Ill.	Cole	Elgin Motor Co.
Elizabethtown, Pa.	Marathon	E. B. Cobble.
Elkdale, Ia.	Marathon	Ditmer & Stallbaum.
Fall River, Mass.	Marathon	Geo. E. Bennett.
Flatonia, Tex.	Marathon	Flatonia Automobile Co.
Ft. Wayne, Ind.	Marathon	Auburn Auto Co.
Garden Grove, Ia.	Oakland	Roberts & Herweh.
Glendale, O.	Marathon	Glendale Garage.
Goldendale, Wash.	Cole	R. D. Sunderland.
Gooding, Ia.	Cole	Walter Gooding.
Hagerstown, Md.	Oakland	Edw. Strock.
Hallwood, Va.	Oakland	Hallwood Feed Supply Co.
Harrisburg, Pa.	Marathon	West End Garage.
Helena, Ark.	Cole	B. L. Lyford.
Indianola, Ia.	Oakland	Dale Smith.
Jamaica, Ia.	Oakland	Geo. W. Heater.
Jefferson, Ia.	Oakland	R. S. Richardson.
Johnson City, Tenn.	Marathon	Johnson Auto Co.
Kane, Pa.	Cole	Kane Supply Co.
La Crosse, Wis.	Marathon	La Crosse Plow Co.
La Crosse, Wis.	Marathon	Rybold & Weihaupt.
Lamartine, Wis.	Marathon	S. E. McCumber & Co.
Laurel, Md.	Oakland	S. T. Baublitz.
Lexington, Ky.	Franklin	Phoenix Motor Car Co.
Little Rock, Ark.	Marathon	Ketcher & Co.
Los Angeles, Cal.	Marathon	South Western Motor Car Co.
Lynchburg, O.	Marathon	Geo. T. Delaney.
Lynchburg, Va.	Oakland	A. E. Hart.
Lynn, Mass.	Marathon	Armory Garage.
Manchester, Mo.	Marathon	Manchester Auto Supply Co.
Manchester, N. H.	Marathon	H. L. Lamphrey.
Mappsville, Va.	Marathon	J. Ralph Gordy.
Markel, Ind.	Marathon	Marathon Sales Co.
Middletown, Md.	Oakland	Model Garage.
Milwaukee, Wis.	Marathon	Jesse A. Smith.
Minneapolis, Minn.	Marathon	La Crosse Auto Co.
Monroe, Ia.	Oakland	Hagen & Gloyd.
Montmorenci, Ind.	Marathon	Jacob Habben.
Montpelier, Ind.	Marathon	A. M. Keller.
Mt. Auburn, Ill.	Cole	H. S. Armstrong.
Nashville, Tenn.	Marathon	State Motor Car Co.
Nashville, Wis.	Buick	F. J. Rogers.
Nashville, Wis.	Henderson	F. J. Rogers.
Newell, Ia.	Marathon	Herman Zinn & Co.
Newport News, Va.	Oakland	Peninsula Auto & Garage Co.
New Sharon, Ia.	Marathon	Burt Beal.
New York City	Marathon	C. L. Thurston.
New York City	Marathon	Richardson, Orr & Co.
New York City	Marathon	F. Rosensyern.
Norfolk, Va.	Oakland	Norfolk Garage Co.
Ocheyedan, Ia.	Marathon	Ocheyedan Auto Co.
Omaha, Neb.	Cole	Drummond Motor Co.
Parkersburg, W. Va.	Cole	The Cole Motor Co.
Pittsburgh, Pa.	Marathon	I. H. McClarren.
Providence, R. I.	Marathon	Whitten Motor Car Co.
Punxsutawney, Pa.	Cole	The McQuown Auto Co.
Reeseville, Wis.	Marathon	Schippleger Bros.
Richmond, Va.	Oakland	M. M. Pharo.
Roanoke, Va.	Oakland	Yost-Huff & Co.
Rochester, N. Y.	Franklin	Franklin Motor Car Co.
Sioux City, Ia.	Marathon	Adams Auto Co.
Springfield, Vt.	Marathon	Clarence E. Gowing.
Springvale, Me.	Marathon	Butler & Berry.
Staunton, Va.	Oakland	Beverly Garage.
St. Louis, Mo.	Marathon	Lindell Auto Sales Co.
St. Marys, Pa.	Cole	W. G. Wismeth.
Summit Station, Pa.	Marathon	Casper Roeder.
Tarboro, N. C.	Marathon	The Garage Co.
Tipton, Ind.	Marathon	Norris & Co.
Topeka, Kan.	Cole	George R. Evans.
Union City, Ind.	Marathon	I. M. Thornburg & Co.
Walton, Ind.	Marathon	D. F. Hendrickson.
Washington, D. C.	Cole	Cole Motor Sales Co.
Washington, Pa.	Marathon	D. P. Hart.
Washington, D. C.	Oakland	Wm. Mullen.
Waukee, Ia.	Marathon	W. P. Kent.
Waukesha, Wis.	Ford	Spring City Auto Co.
Wheeling, W. Va.	Marathon	W. W. Price.
Wilkes-Barre, Pa.	Marathon	Johnson Motor Car Co.
Wilmington, O.	Marathon	Peebles Motor Car Co.
Woodstock, Ill.	Marathon	Woodstock Implement Co.

Accessories for the Automobilist

MARANVILLE Oiling System—A variable level system of splash lubrication with stationary troughs, is the phrase that most briefly describes the oiling system made by the Maranville Base & Filter Co., Cleveland, O. Troughs in the path of the connecting-rod scoops are employed, the lowest level in the troughs being pre-determined by V-shaped notches, as shown in Fig. 1. Oil is supplied to each of these troughs by a small pipe at right angles to the scoop path. The stream of oil delivered by this pipe serves to refill the groove made in the surface of the oil by the passage of the scoop, and, due to its location, it gives the equivalent of a raised level when the oil pump speed is sufficient to force a jet clear across the trough. Oil pump size and speed can be manipulated until the jet is only thrown across at high speeds and merely keeps the trough full, to the bottom of the V notch, at the slowest speeds required. When these two points are determined all intermediate speeds take care of themselves in proportion, it is said. Since the trough feed pipes are supplied through a manifold by a positive pump driven directly by the motor, the delivery will be directly proportional to motor speeds. Fig. 3 shows the application of Figs. 1 and 2 in the oil base of a typical six-cylinder, four-cycle motor. It will be noted that when the oil overflows the trough under the connecting-rods it runs down the inclined channels at the sides taking with it such oil and dirt as may have been washed down the sides of the crank chamber. It first reaches a secondary trap where heavy sediment and water are deposited. The oil, after passing through this settling process, overflows at the top into the float-chamber. From thence it is pumped around and delivered again to the manifold previously mentioned. As the oil in the system is used up fresh lubricant is supplied through the float valve, Fig. 4. A filter is used to remove water and grit, the salient features of which are given in Fig. 5. The oil is pumped in at the inlet directly into a sediment trap from whence it overflows through the small holes shown at the top thereof. It then passes down the shell in a thin sheet, giving considerable cooling effect, and into another large sediment trap. It then passes up inside the second wall and thence radially through a special filter mass of 40 square inches exterior area. After passing through this mass it enters the central core through the holes shown and passes out as indicated.

Ingersoll-Rand Imperial Twelve—Among the many compressors produced by the Ingersoll-Rand Co., New York City, the Imperial Twelve is probably the most desirable for general garage service. The outfit consists of an air or water-cooled single cylinder air-compressor, belt driven by an electric motor, and a large receiver or storage tank mounted on a three-wheeled truck. The portability of the unit allows the use of compressed air wherever it is wanted, without the necessity of an extensive piping system. The motor bore is 2.5 inches and the stroke 3 inches, which gives a capacity of 6 cubic feet per minute at 700 revolutions. Either 110 or 220-volt direct current or 110, 220 or 440-volt, two or three-phase alternating current motors are furnished. The equipment includes 20 feet of hose with tire connection and gauge, and 20 feet of lamp cord with attachment plug. The compressor sells for $190, fully equipped.

Seamless Gasoline Tank—A brand new model square or bolster shaped seamless drawn gasoline tank which is intended to hang at the rear of the car and used with pressure feed, is made by the Janney Steinmetz Co., Philadelphia, Pa. Fittings include brass goose neck extension for filling, outlet with sediment cup, up feed tube for pressure feed and a gasoline indicator to show contents. The advantages claimed for the underhung rear tank are that it is safer, more accessible and that a better distribution of weight is obtained.

Motobestos—A brake lining that is said to be proof against oil, grease, water, mud and dust and one that will not squeak, but will hold tightly and wear long is offered by the Calmon Asbestos & Rubber Works of America, 130 John street, New York City. This lining is an asbestos fabric in which are imbedded fine brass wires and which is impregnated with a compound that is said to give it the exceptional properties claimed for it.

Manzel Pump—A two-cylinder, air-cooled tire pump which is intended to be driven by the engine is produced by the Manzel Bros. Co., 309 Babcock street, Buffalo, N. Y. It resembles an automobile motor in that the cylinders are cast together and a barrel crankcase is used with the crankshaft removable through a plate at one end. The cylinder dimensions are 1.63 by 1.75 inches, bore and stroke, which enables the pump to inflate a 36 by 4.5-inch tire to 90 pounds pressure in 1.33 minutes. The cylinders and pistons are finished by lapping and the crankshaft is a drop forging ground

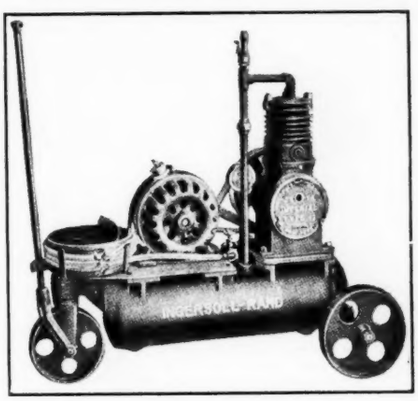
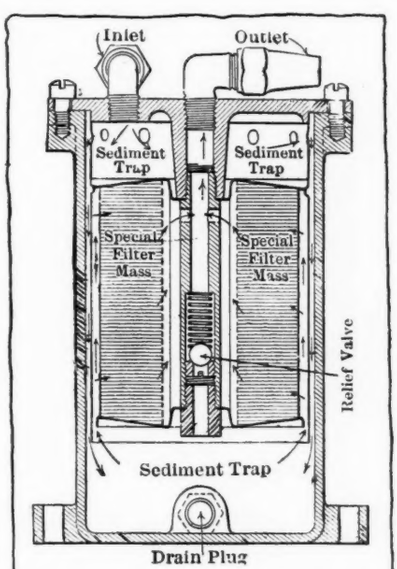
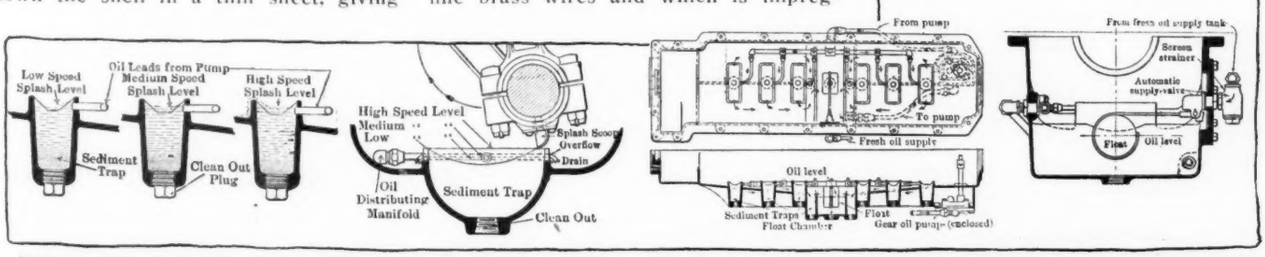


Fig. 6—Ingersoll-Rand portable garage compressor





Maranville oiling system—Fig. 1— Extreme left, splash troughs, showing how variation in level is produced. Fig. 2—Left center, cross-section through splash trough giving path of connecting rod. Fig. 3—Right center, longitudinal section and plan view of crankcase. Fig. 4—Lower left, float valve for supplying fresh oil. Fig. 5—Upper left, Cross-section through filter

Fig. 9—Top, left, Manzel motor-driven tire pump

Fig. 10—Bottom, left, Pomo pocket trouble lamp

Fig. 11—Left, Woodworth tread with section through non-skid rivet at top

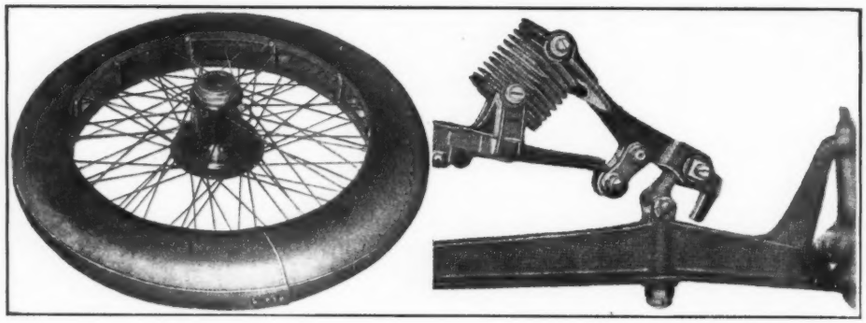


Fig. 7—Allen wire wheel tire case

Fig. 8—Hassler shock absorber

to size and mounted on bronze bearings. The connecting-rods are also of this material and so the wrist and crankpin bearings are made by merely machining the two ends of the rod to exact size. Lubrication is by splash with an oil reservoir in the crankcase, to which lubricant is added occasionally. Air is drawn into the cylinder through ports on each side of it, which are uncovered by the piston at the bottom of its stroke, the air rushing in to fill the vacuum caused by the piston. Discharge valves are of the ball type, held to their seats by spiral springs. These valves automatically open when a point on the compression stroke is reached where the pressure in the cylinder equals the pressure in the line plus the pressure required to open the valve. There is a safety valve in the exhaust passageway to prevent the pressure from rising high enough to burst the tires in case the operator should absentmindedly go away and leave the pump running. The equipment includes 15 feet of rubber hose and a nickel-plated gauge which is placed 3 feet from the end of the hose so that it can be read conveniently. With dog clutch or gear drive, this pump sells for $28, and without either of these for $25.

Allen Wire Wheel Case—Due to the fact that, as a rule, wire wheels are not fitted with demountable rims, but are designed so that the whole wheel is changed when a tire repair is made, the ordinary type of tire cover is unsuited for the spare tires carried because the spokes interfere with the cover's attachment. These considerations led the Allen Auto Specialty Co., New York City, to design the tire cover shown in Fig. 7, in which the inner edges of casing consist of two heavy fabric rings. These rings are held together by small straps which force them against the rim of the wheel, thus making a tight joint with it.

Hassler Shock Absorber—A new type of spring shock-absorber for which great durability and easy-riding qualities are claimed is illustrated in Fig. 8. At present this equipment is made by R. H. Hassler, Indianapolis, Ind., for Ford cars, but plans are under way for adapting it to all makes. The illustration shows one of the shock-absorbers applied to a Ford car. The end A of the leaf spring is supported by the lever E in such a way that when the spiral spring closes the point A yields downward over a range of 1.25 inches. As the coils of the spring are very flat, the action is extremely soft, and the sharp jolts and jars of a rough road are readily absorbed by it. The upward toss of the leaf spring is prevented by the arm C which engages with the axle at the time of upthrow, holding the lever E stationary and thus, through the compression of the spiral spring, holds the leaf spring down.

Pomo Lamp—What is claimed to be the smallest trouble lamp, Fig. 10, comes from the factory of the G. C. Parker Co., 122 Milk street, Boston, Mass. It can be hung from the buttonhole of your coat or the brim of your hat, or any other convenient place. This lamp is an all-metal construction, finished in nickel. Illumination is furnished by a 6-volt, 6-candlepower tungsten bulb, the bulb being well protected by a suitable guard. Ediswan sockets are used for lamp base and battery plug, and are connected by 10 feet of silk cord. The price of this lamp is $2.

Tire Tread—The illustration, Fig. 11, shows a new form of the Woodworth tread which is designed to give traction under the worst conditions of snow and ice, and is intended to be left on the wheels all winter long, as it has no tendency to chafe the tires, it is said. The novel feature of the treads is the special form of the rivet shown in the cross-section, Fig. 11. This rivet has sharp edges and a hardened projecting center which is claimed to give it a sure hold on snow and ice. The rivets are clinched through a soft base consisting of an outer layer of chrome-tanned grain leather which is specially waterproofed to render it permanently soft. This is reinforced with three plies of Egyptian fabric treated to resist decay, and there is a thin inner strip of leather to hold the rivets. The tread is held on to the tires by strong tension springs which automatically take up any stretch occurring in the leather. This accessory is made by the Leather Tire Goods Co., Niagara Falls, N. Y.

Holdfast Match Safe—Hess & Son, Philadelphia, have brought out a match safe which may be fastened to any part of the tonneau of a car, so that when matches are needed they will be at hand. The box of matches is placed on a hinged holder and then pushed back into position. Two prongs pierce the box and a latch spring drops into the lower prong, thus holding the box securely. Often an owner will enter his garage at night without a match and the maker of this device suggests that the safe be placed at a convenient place near the door. The safe retails at 50 cents.

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